Memorandum

SRF No. 13677

To: Chris LaBounty, City Engineer
City of Plymouth, Minnesota

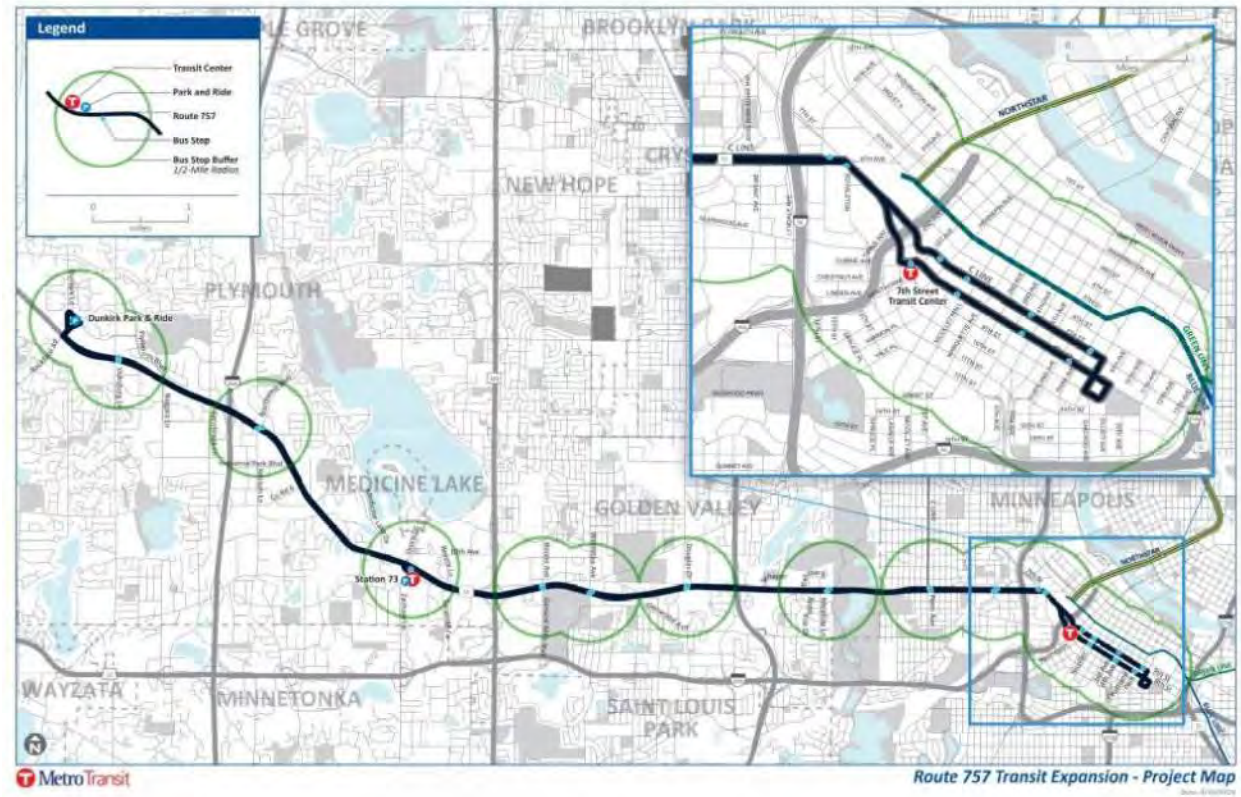
From: Jim Gersema, Principal

Date: 6/25/2021

Subject: Highway 55 Transit Micro Study Summary

The purpose of this memo is to summarize the studies and planning that has been completed that link transit, infrastructure, and development in the Highway 55 corridor within the boundaries of the City of Plymouth. Upcoming implementation of transit Route 757 by Metro Transit, Figure 1, and continued conversations about bus rapid transit (BRT) in the corridor triggered the need to better understand how the locally built environment could be adjusted to improve the vitality of those transit improvements.

Figure 1. Metro Transit Route 757 Project Map



Summary of Coordination

A critical part of the micro study involved coordination between the City of Plymouth and additional stakeholders. This coordination included the Technical Advisory Committee (TAC) consisting of MnDOT, Hennepin County, Metropolitan Council, Metro Transit and the City of Golden Valley. Additionally, separate meetings with individual stakeholders occurred to discuss specific elements of the project. A summary of these meetings is summarized in Table 1. Outside of these meeting the City also coordinated with the City of St. Louis Park.

Table 1. Summary of Coordination Meetings

Date	Description
12/22/2020	TAC
1/26/2021	Three Rivers Park District
2/1/2021	MnDOT
2/4/2021	TAC
3/18/2021	TAC
5/20/2021	TAC
6/9/2021	MnDOT
6/10/2021	Three Rivers Park District

Highway 55 Potential Transit Design Improvements

Private redevelopment opportunities and public infrastructure investment will occur in the Highway 55 corridor in coming years. To help shape these public and private investments in the corridor, a greater understanding of what improvements is desired for the upcoming Metro Transit Route 757 and potential Highway 55 BRT advancement. MnDOT has a planned pavement preservation project that will also include improvements for pedestrian safety. This project provides an opportunity to construct additional transit supportive infrastructure.

Potential station designs were developed and evaluated at the following locations:

- Dunkirk Lane at Rockford Road
- Vicksburg Lane at Highway 55 and the City Center site
- Northwest Boulevard at Highway 55
- Station 73 Park-and-Ride
- Ford Road at Shelard Parkway

A summary of this design review process is included as Attachment A.

Station Area Review

Both land use and the bicycle and pedestrian network are key aspects of the physical environment that must be considered to be consistent with various community and regional goals. Ultimately, station areas and transit service should strive for a symbiotic relationship - creating supportive residential and commercial density, convenient and safe circulation routes, and an attractive sense of place. Each of the five potential station areas were reviewed and documentation of that analysis is included in Attachment B.

Traffic Analysis

To support the station area review and concept development traffic analysis was performed (documented in Attachment C). The following four locations were reviewed to evaluate the effects of incorporating transit signal priority:

- Intersection of Highway 55 and Plymouth Boulevard / Niagara Lane.
- Highway 55 between Xenium Lane and I-494 northbound ramps.
- Intersection of Highway 55 and County Road 73.
- Intersection of Highway 55 and Revere Lane.

Station 73 Underpass Concept Advancement

The Station 73 underpass concept was well-received by staff but is somewhat limited in flexibility as the concept is best implemented with the MnDOT pavement preservation project in 2024. To better understand the concept, the design was advanced to provide more details on the construction limits associated with raising the grade to allow for the underpass. The result of this advancement is included as Attachment D. A cost estimate was developed for this concept to provide some guidance for budgeting this type of improvement. A summary of this estimate is included as Table 2.

Table 2. Station 73 Underpass Concept Cost Estimate Summary

PROJECT ELEMENT / COST ESTIMATES ITEM	COST
Mobilization (approx. 5% of total cost)	$347,000
Removals	$76,140
Roadway (grading, borrow, etc.)	$1,272,150
Roadway (aggregates and paving)	$824,000
Storm Sewer & Ponds	$255,555
Concrete Items (curb & gutter, sidewalks, median barriers)	$58,125
Pedestrian Curb Ramps (ADA)	$12,600
Path / Trail Construction	$70,000

PROJECT ELEMENT / COST ESTIMATES ITEM	COST
Traffic Control	$555,000
Striping	$5,000
Signing	$15,750
Lighting	$50,000
Turf-Erosion & Landscaping	$348,000
Bridge	$2,075,000
Retaining Walls	$1,583,150
Traffic Signals	$285,000
Other Roadway Elements	$694,000
Contingencies	$1,706,000
TOTAL CONSTRUCTION COST (CURRENT YEAR DOLLARS)	$10,232,470
INFLATION (2021 to 2024)	$1,200,000
TOTAL PROJECT COST (OPENING YEAR DOLLARS)	$11,432,470

Included in this estimate are approximately $500,000 - $1,000,000 of pavement and intersection costs that would otherwise be included in the MnDOT pavement preservation project for this area. Initial conversations have suggested that MnDOT would be able to contribute that budget to the construction of the underpass. Through additional coordination with MnDOT and TRPD there are opportunities for design refinements that can lower the project costs. Some of the key opportunities are:

- Selection of a different bridge / box culvert type for the underpass.
- Use of alternate retaining wall types.
- Altering the alignment of eastbound TH 55 to reduce retaining wall length.
- Adjustments to the roadway profile to minimize the extent of the grade raise.

Through these and other cost reduction techniques it is possible that the cost of the project can be reduced to between $8,000,000 and $9,000,000.

Conversations with the stakeholder group have indicated that there are possible sources of funding that are available to City contribution on projects like this. Table 3 shows the possible sources and likely year of availability of those funds.

Table 3. Possible Additional Funding Sources

Funding Source	Likely Year of Availability
MnDOT Pavement Preservation	2024
Regional Solicitation	2026 / 2027

Funding Source	Likely Year of Availability
MnDOT Transit Advantages	2026
MnDOT Ped / Bike	2026

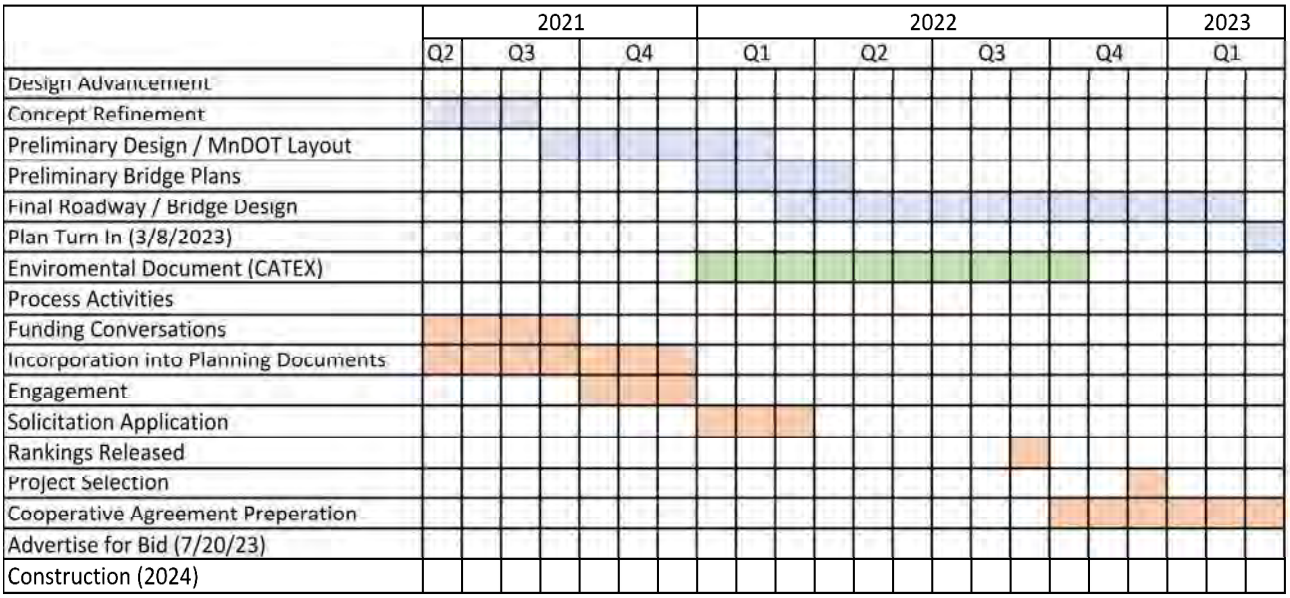
Per analysis conducted in this study, the preferred funding strategy is to collaborate with TRPD on a regional solicitation application in early 2022 and work with TRPD and MnDOT on securing funding to assist with the local match of those federal funds. Since the available funding is largely available beyond 2024, the City of Plymouth would need to advance the funding to allow the project to be constructed in coordination with the MnDOT pavement preservation project.

In order to position this project for the receipt of federal funding through the regional solicitation program there are some key activities to complete prior to any application. The following activities increase the chance for success in this program.

- Clear partnership between the City, TRPD and MnDOT.
- Advancement of the design of the project.
- Inclusion of the project in local and regional plans.
- Public engagement for the project.

Figure 2 shows a possible implementation schedule that incorporates these activities with the additional design activities needed to achieve project delivery with the MnDOT pavement preservation project.

Figure 2. Proposed Implementation Schedule



Project Visualizations

To assist in the communication of transit improvements in the Highway 55 corridor to stakeholders, policy makers and the public, visualizations were created at key locations. With the interest in the underpass at Station 73, figures 3-5 are visualizations created to show those improvements and figure 6 shows the improvements at Northwest Boulevard.

Figure 3. Visualization of the Station 73 Underpass Looking West

Figure 4. Visualization of the Station 73 Station Looking West

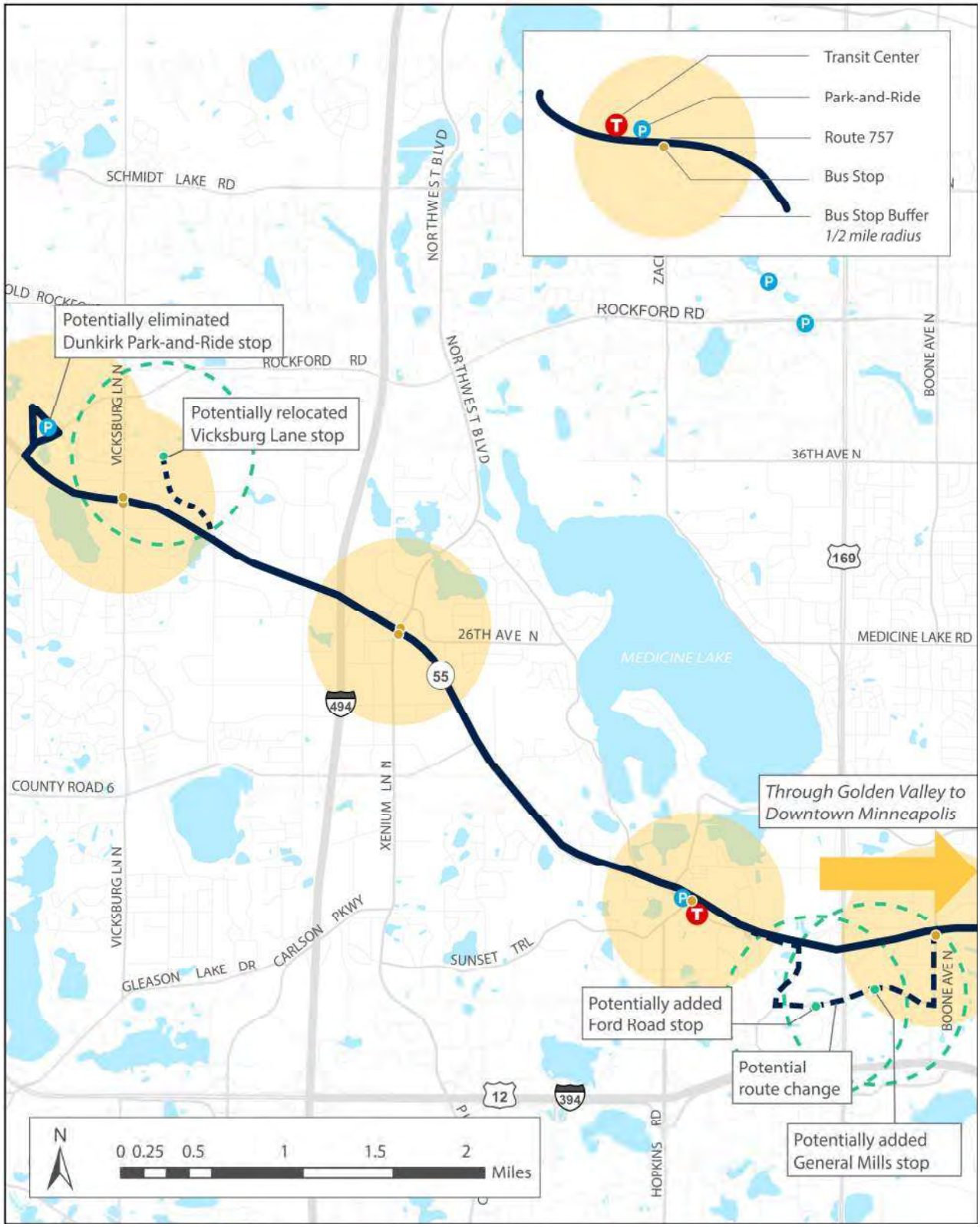
Figure 5. Visualization of the Station 73 Eastbound Station Looking Northeast

Figure 6. Visualization of the Northwest Boulevard Westbound Station Looking Northwest

Metro Transit Route 757

There are additional considerations for the alignment and stations included in the Metro Transit Route 757 implementation. It is anticipated that additional analysis will be completed by Metro Transit to determine the routing and station locations. Considerations for that analysis are documented in Figure 3.

Figure 7. Potential Metro Transit Route 757 Adjustments



Next Steps

Between the conclusion of this study and the implantation of Metro Transit Route 757 there are several activities that will need to be completed to improve the vitality of transit in the Highway 55 Corridor. These include the following station area specific activities as well as corridor wide activities.

Dunkirk Lane

- Continue to evaluate development opportunities in this area for their development potential.
- Evaluate the long-term viability of the Dunkirk park and ride at this location.

Vicksburg Lane / City Center

- Coordinate with Metro Transit the routing of the Route 757 into the City Center site.
- Determine the location of bus stop (Hilde Performance Center, Hennepin County Library or both) and potential layover location for the Route 757.
- Coordinate with Plymouth Metrolink and Metro Transit the transit improvements of the selected bus stop into the reconstruction of Plymouth Boulevard and 36th Avenue.
- Consider establishing a park and ride service within the City Center boundary.
- Evaluate bicycle and pedestrian network considerations identified in the Station Area Planning document.

Northwest Boulevard

- Concurrent with redevelopment in the southwest quadrant of Highway 55 and Northwest Boulevard, construct a parking structure with pedestrian overpass at the proposed station location.
- Coordinate with Metro Transit opportunities for a local stop location if development does not occur prior to implementation of the Route 757.
- Evaluate bicycle and pedestrian network considerations identified in the Station Area Planning document.

Station 73

- Coordinate with MnDOT and TRPD on the implantation of an underpass and bus stops concurrent with the MnDOT pavement preservation project.
- Evaluate bicycle and pedestrian network considerations identified in the Station Area Planning document.

Ford Road

- Identify opportunities in the capital improvement program to improve ADA and local bus stop amenities in the northwest quadrant of the intersection of Ford Road and Shelard Parkway.
- Evaluate bicycle and pedestrian network considerations identified in the Station Area Planning document.

Corridor Wide

- Coordinate with Metro Transit on the routing and stop locations for the Route 757.
- Perform additional station area reviews and consider revising zoning requirements at station locations to align with transit supportive land uses.
- Evaluation Plymouth Metrolink service plans and develop updated plans that complement the future Metro Transit Route 757 service.
- Continue to participate in the conversation regarding the feasibility review of BRT in the Highway 55 corridor.

Attachments

Attachment A – TH 55 Potential transit Design Improvements

Attachment B – Station Area Planning, Land Use, Bicycle and Pedestrian Network

Attachment C – TH 55 BRT Traffic Analysis

Attachment D – Station 73 Underpass Roll Plot

Attachment A

Memorandum

SRF No. 13677

To: Chris LaBounty, City Engineer
City of Plymouth

From: Jim Gersema, Principal
Eric Elert, Engineer

Date: May 12, 2021

Subject: TH 55 Potential Transit Design Improvements - DRAFT

Objective

Private redevelopment opportunities and public infrastructure investment will be occurring in the TH 55 corridor in the upcoming years. In order to help shape these public and private investments in the corridor, a greater understanding of what improvements may be desired for the upcoming Metro Transit Route 757 initiation and potential Hwy 55 BRT advancement was desired. MnDOT has a planned pavement preservation project that will also include improvements for pedestrian safety. This project provides an opportunity to construct additional transit supportive infrastructure with that project.

To better understand the potential design of bus rapid transit (BRT) improvements on the TH 55 corridor in Plymouth, this study prepared conceptual BRT and local station designs at potential station locations. This document seeks to provide context to those station area options on the potential TH 55 BRT corridor. Existing conditions, proposed design options and the working design recommendation are provided. These recommendations can help the City guide potential development activity to support transit at these locations.

Dunkirk Lane

Existing Conditions

The Dunkirk Lane Station would be placed near the northeast corner of the TH 55 and Rockford Road intersection. Currently, there are a few businesses in the area, including Tri-State Drilling and Dundee Nursery & Landscaping. The city is reviewing a potential development in the area that would replace the nursery with a mixed-use development including multi-family homes and medical office space. Otherwise, there are a few wetlands that would need to be protected. A Plymouth Metrolink park and ride operates out of this area and utilizes leased parking spaces from the Plymouth Presbyterian Church. The Dunkirk Station was identified as potential end of line station for the proposed Metro Transit Route 757.

Option 1 – Tri-State Drilling Site

The first option includes replacing the current Tri-State Drilling site with a new publicly owned park and ride facility that would include an extension of Dunkirk Court North to travel through the new site. This option would include one 130-foot transit platform, approximately 116 new parking stalls, and a bus operator restroom facility. Several connections to nearby pedestrian walkways would be made, and a stormwater BMP would be constructed onsite. (See Figure 1)

Option 2 – Along Existing Dunkirk Court North

This option does not replace the Tri-State Drilling site and instead uses a combination of existing and proposed development infrastructure. Only one transit platform would be constructed with all buses traveling in the same direction through the facility. Parking from the proposed site development would be leased instead of a separate park and ride. Additionally, a driver restroom would be located near the site. (See Figure 2)

Recommendation

Options for the inclusion of transit investments in this area will depend on status of redevelopment and further evaluation of transit demand at this potential station area. No recommendations are provided at this time.

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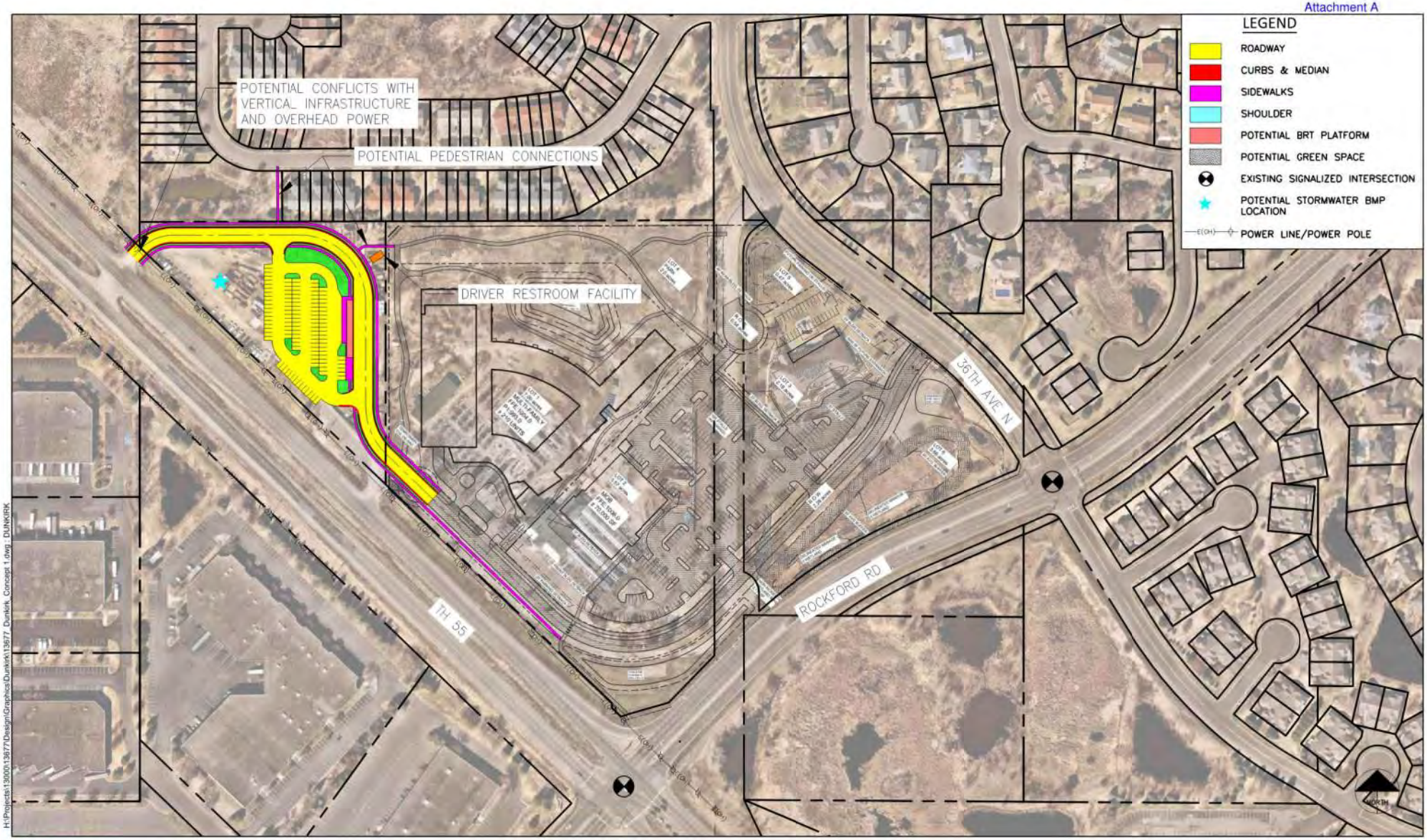

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TH 55 BRT

DUNKIRK PARK AND RIDE - OPTION 1

Figure 1

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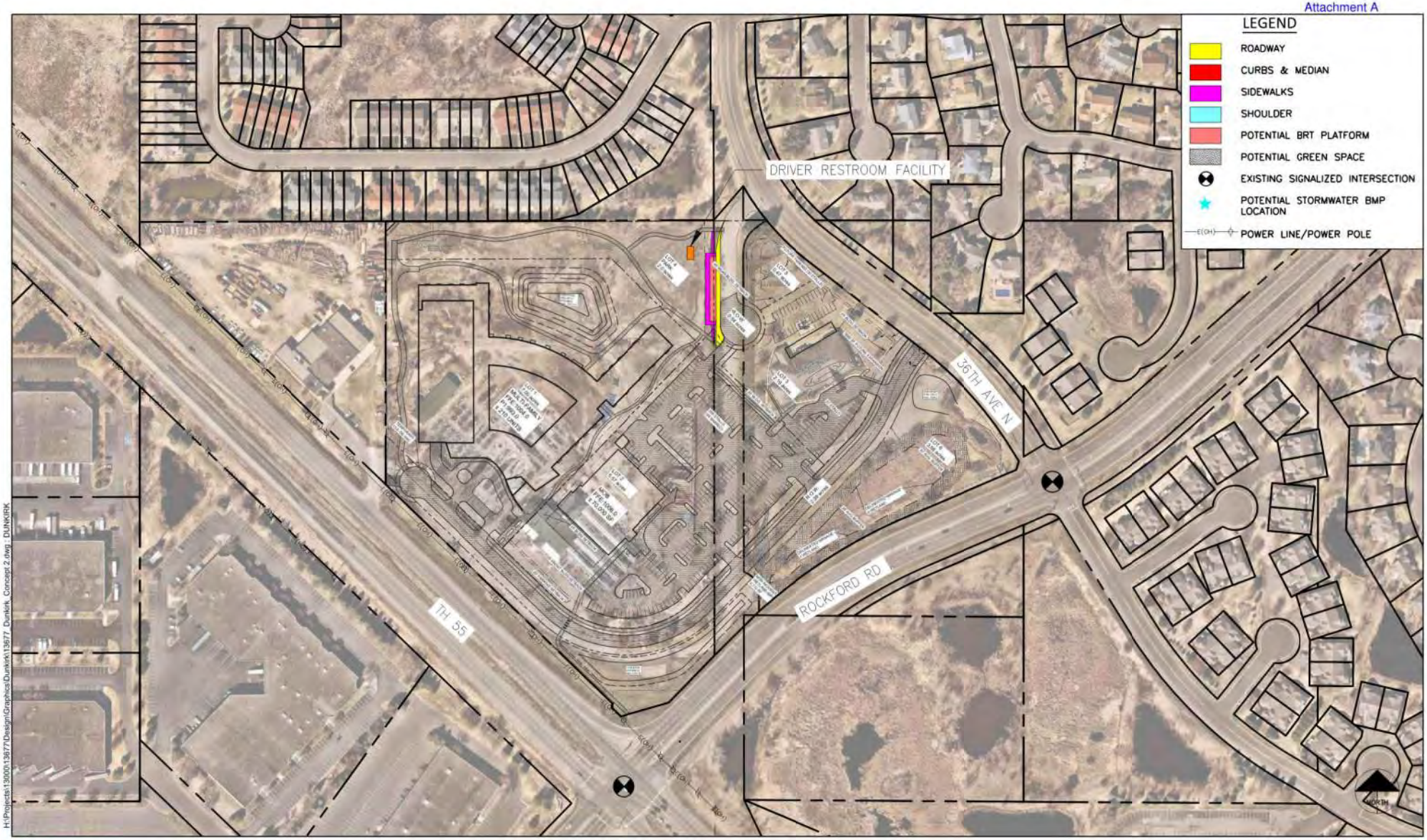
Attachment A



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TH 55 BRT
DUNKIRK PARK AND RIDE - OPTION 2

Figure 2

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Vicksburg Lane

Existing Conditions

The Vicksburg Lane Station would be placed in the vicinity of TH 55 and Vicksburg Lane North. The area is widely developed with commercial, industrial, and city-owned properties extending in each direction. Many important landmarks include the Plymouth Grand 15 movie theater, Plymouth City Hall, Plymouth Library, and other large attractions. The area is guided by the City Center 2.0 master plan. In addition to adding more green space and improving pedestrian access, much of the land will see new land uses. Overhead power lines run on the south side of TH 55, so any construction along the highway would likely involve relocation of electric utilities.

Option 1 – In Line Station with Overpass

The most direct travel option would be to locate the platforms on both sides of TH 55 between Vicksburg Lane and Plymouth Boulevard. Buses would require deceleration and acceleration space on both sides of the highway, as well as increased pedestrian and trail connections. Vertical transit station infrastructure would be constructed outside of the roadway clear zone. A skyway with elevator buildings would be recommended with this station concept to improve pedestrian safety between each side of TH 55. Park and ride joint use spaces could potentially be designated within close vicinity to the station. (See Figure 3)

Due to the constrained right of way and proximity to groundwater, an inline station with underpass at the intersection of Vicksburg Lane was not evaluated.

Option 2 – 35th Avenue

With much of the local development centered around locally owned facilities, the station could be located close to City of Plymouth property, specifically the Hilde Performance Center. This option would include two platforms on either side of Plymouth Boulevard straddling the intersection with 35th Avenue North, which is largely used as an entrance and exit for local businesses. This location would easily serve City Hall, local businesses, as well as the Life Time Fitness just to the north. A limited number of parking spaces would need to be removed along Plymouth Blvd to accommodate the platforms. Park and ride joint use spaces could potentially be designated within close vicinity to the station. (See Figure 4)

Option 3 – Hennepin County Library

The final Vicksburg station option would be sited in the south parking lot area of the Hennepin County Library. Located along 36th Avenue North between Vicksburg Lane and Plymouth Boulevard, this is located centrally in the City Center area. A single platform would be constructed at this site that allows for bus access to the north and south edge of the platform. Park and ride joint use spaces could potentially be designated within close vicinity to the station. (See Figure 5)

Recommendation

With the existing and potential development opportunities in the City Center area it is recommended to deviate from Hwy 55 to provide better access to this development. This deviation does not preclude any potential routing further west of this area. Both options 2 and 3 should be further evaluated by the City as they advance planning for the reconstruction of Plymouth Boulevard and 36th Avenue. At the time of that reconstruction, a preferred station location should be identified and included as part of that construction. If the Plymouth City Center station functions as the end of the line station for the proposed route 757 or future BRT, a bus layover and driver restroom accommodations should be made. In option 2 this could be accommodated with some improvements to the Plymouth Town Square facility at 37th Avenue and for option 3 this can happen at the platform with the inclusion of a driver restroom facility.

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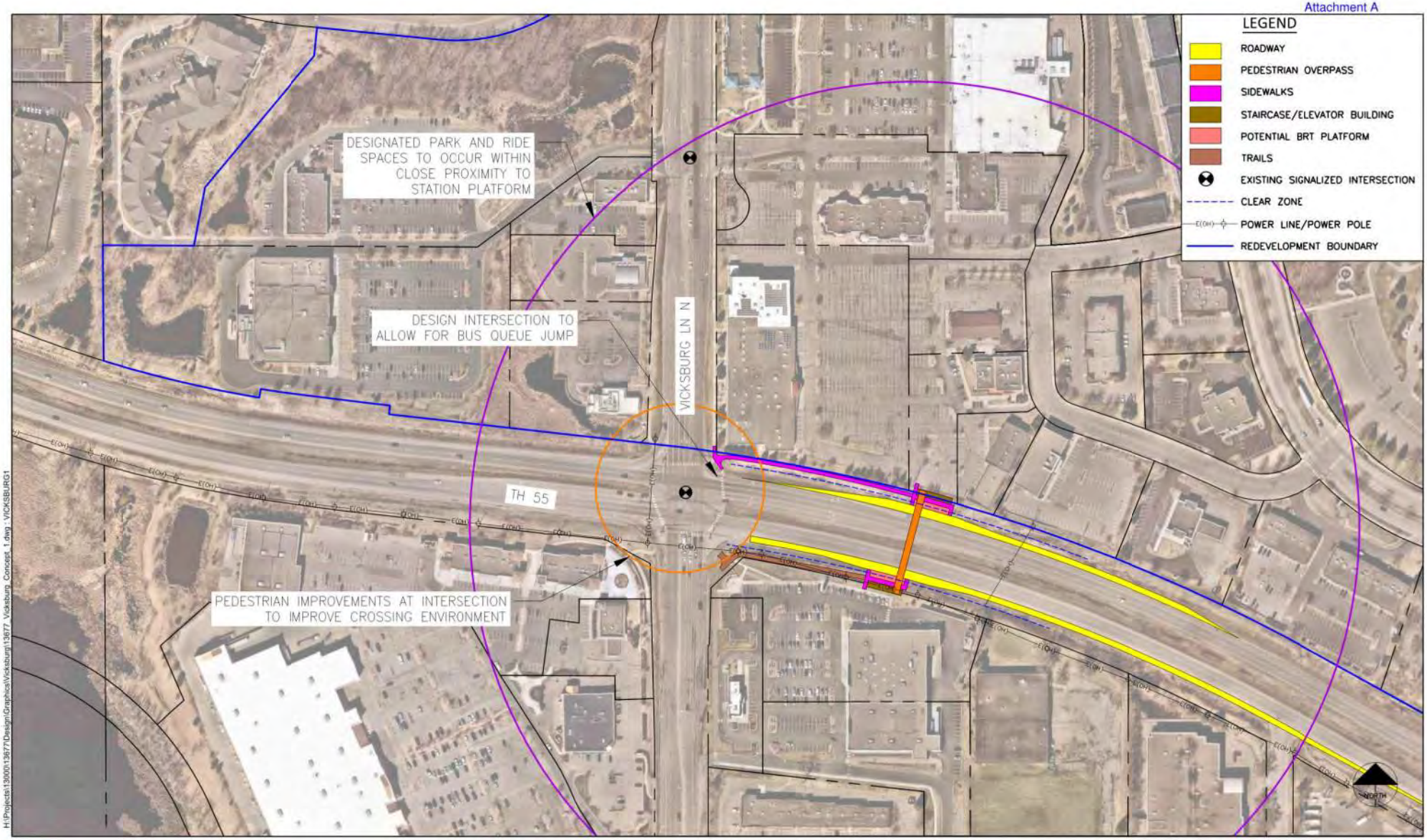

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TH 55 BRT
VICKSBURG - OPTION 1

Figure 3

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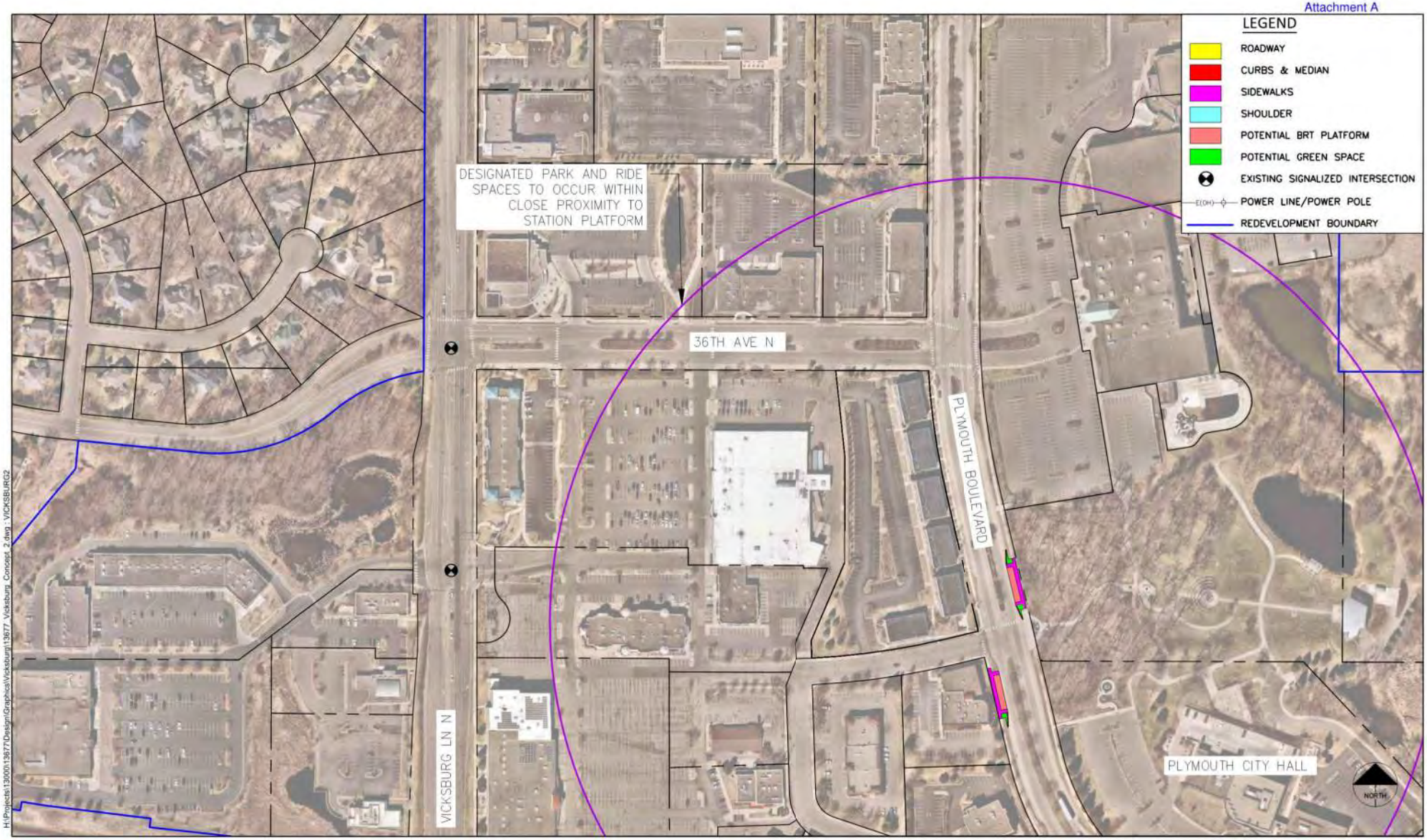
Attachment A



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TH 55 BRT
VICKSBURG - OPTION 2

Figure 4

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Attachment A

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TH 55 BRT
VICKSBURG - OPTION 3

Figure 5

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Northwest Boulevard

Existing Conditions

Just east of the TH 55 and TH 494 Interchange, the TH 55 and Northwest Blvd intersection is a regional jobs hub, with several commercial and industrial interests, as well as the Abbott Northwestern West Health Hospital. At this location, TH 55 will be improved by MnDOT to enhance pedestrian facilities and traffic operation. Overhead power lines run on the south side of TH 55, meaning any construction on the south side of the highway may require relocation of electric utilities.

Option 1 – In Line Station with Overpass

This design option includes transit platforms on either side of TH 55 between TH 494 and Northwest Boulevard. Both platforms would require deceleration and acceleration lanes, as well as significant pedestrian connections. Vertical transit station infrastructure would be constructed outside of the roadway clear zone. Acceleration lanes would require restriping on the bridge over TH 494 and an additional lane past Northwest Blvd on EB TH 55. Extra shoulder would be constructed along westbound TH 55 to the west of TH 494 to accommodate turning movements and passing buses. A pedestrian skyway and elevator buildings would connect both sides over the wide highway below. The skyway would have potential connections to both the West Health Hospital Campus as well as a potential joint use parking structure and future development on the south side of the highway. (See Figure 6.1 – 6.3)

Due to the constrained right of way and adjacent property topography, an inline station with underpass at the this location was not evaluated.

Option 2 – Local Stop 1

Local stops would be placed close to the TH 55 and Northwest Boulevard intersection with pedestrian and trail connections made along the segment of TH 55. The redevelopment on the south side of the highway will still be coordinated with the trail construction for connections to the local stop platform. (See Figure 7)

Option 3 – Local Stop 2

A second local stop option would place the platforms at the east ramps connecting TH 55 to TH 494. The eastbound station would require a widened shoulder and adjustment to the sidewalk alignment to accommodate a bus pulling out of traffic at that location. The westbound station would be placed along the extra lane to be constructed by MnDOT during TH 55 improvements, so no additional road work would be needed. Sidewalk and trail connections would still be made along the segment of TH 55 between TH 494 and Northwest Boulevard. (See Figure 8)

Recommendation

Concurrent with redevelopment of the area south of TH 55 the joint use parking structure, pedestrian overpass and Inline platforms should be constructed to provide the best opportunity for pedestrian access to the station. If the route 757 will be implemented before the redevelopment and inline station can be constructed. The City, Metro Transit and MnDOT should evaluate each of the local bus stop options for implementation.

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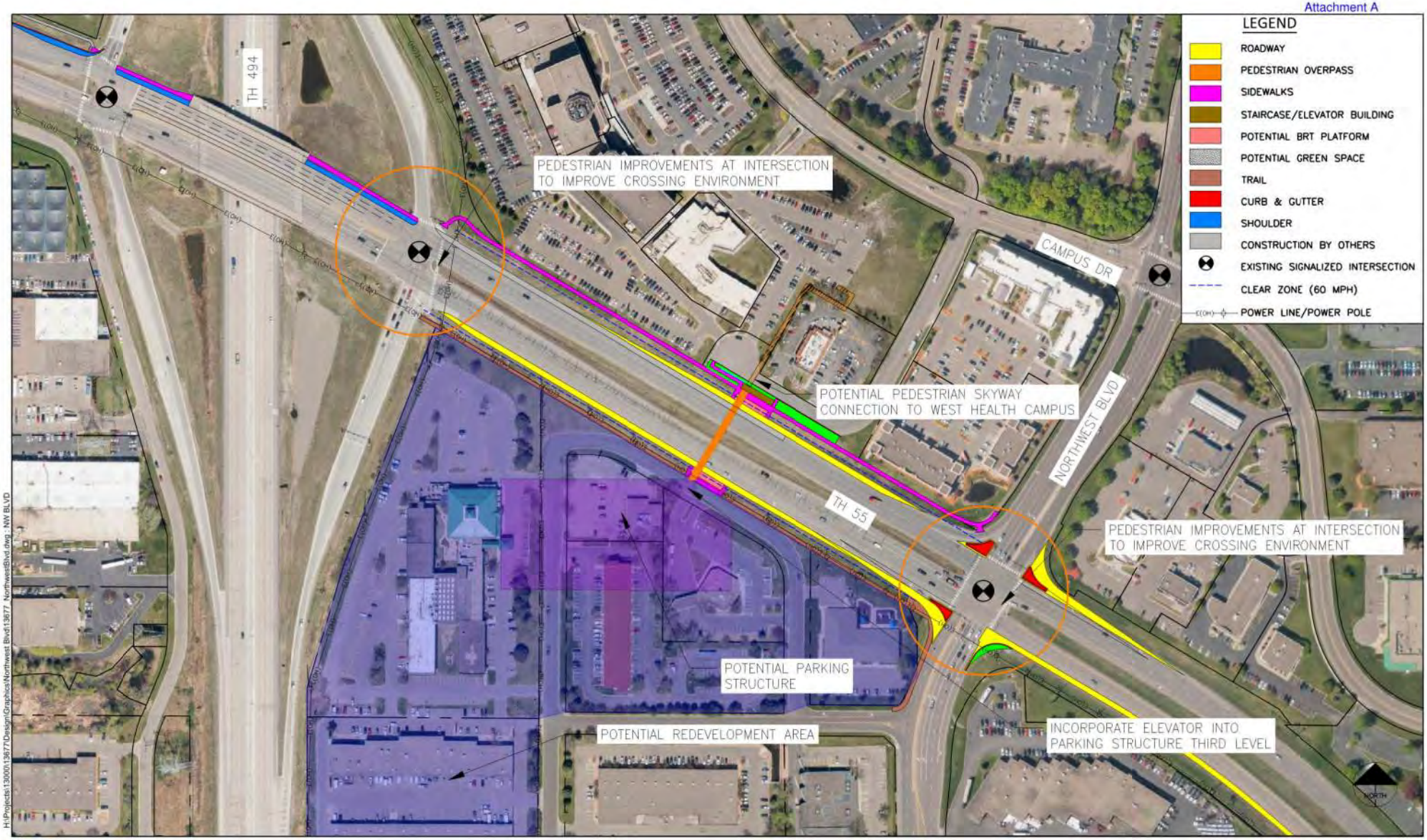

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TH 55 BRT
NORTHWEST BOULEVARD - OPTION 1

Figure 6.1

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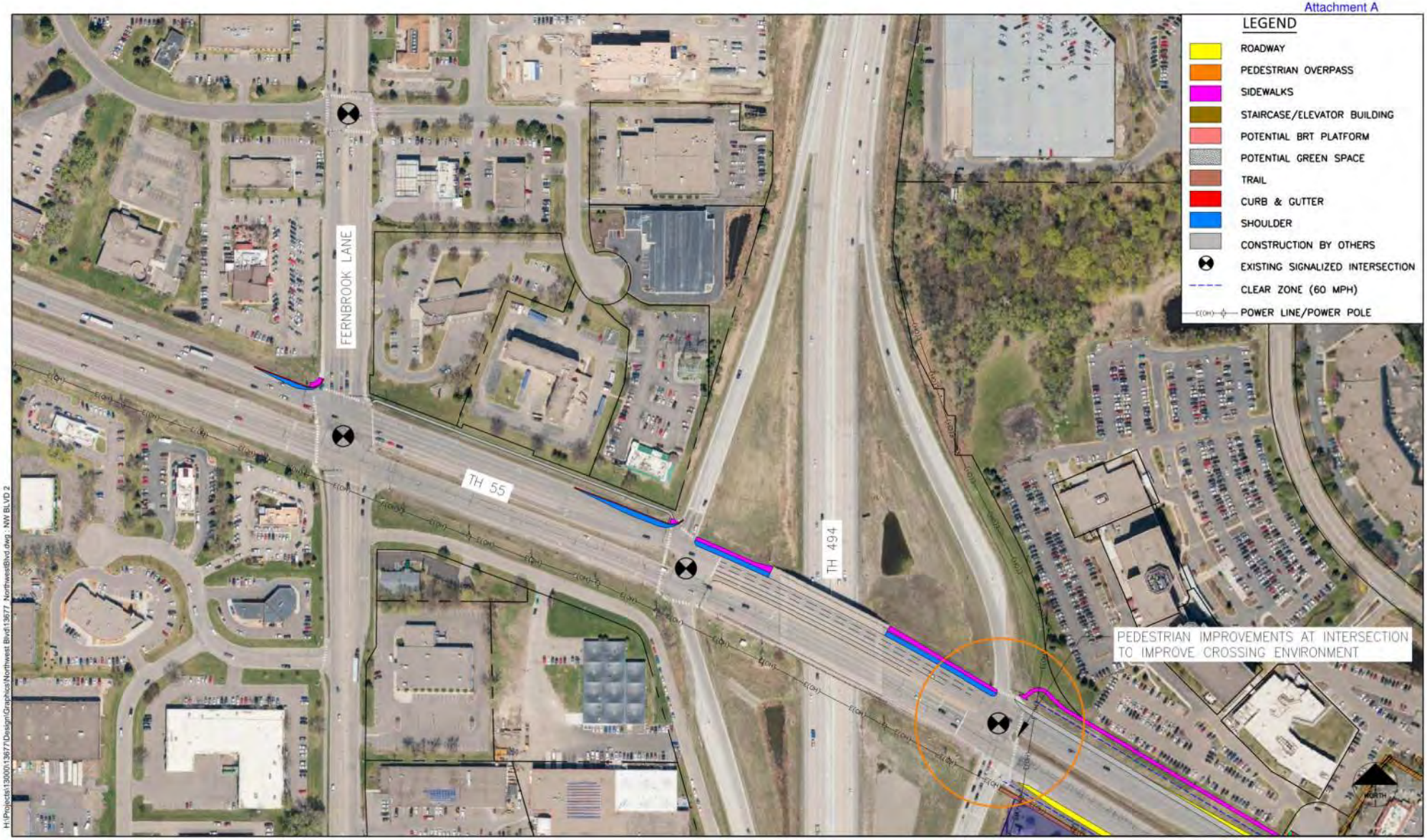
Attachment A



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TH 55 BRT
NORTHWEST BOULEVARD - OPTION 1

Figure 6.2

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Attachment A

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TH 55 BRT
NORTHWEST BOULEVARD - OPTION 1

Figure 6.3

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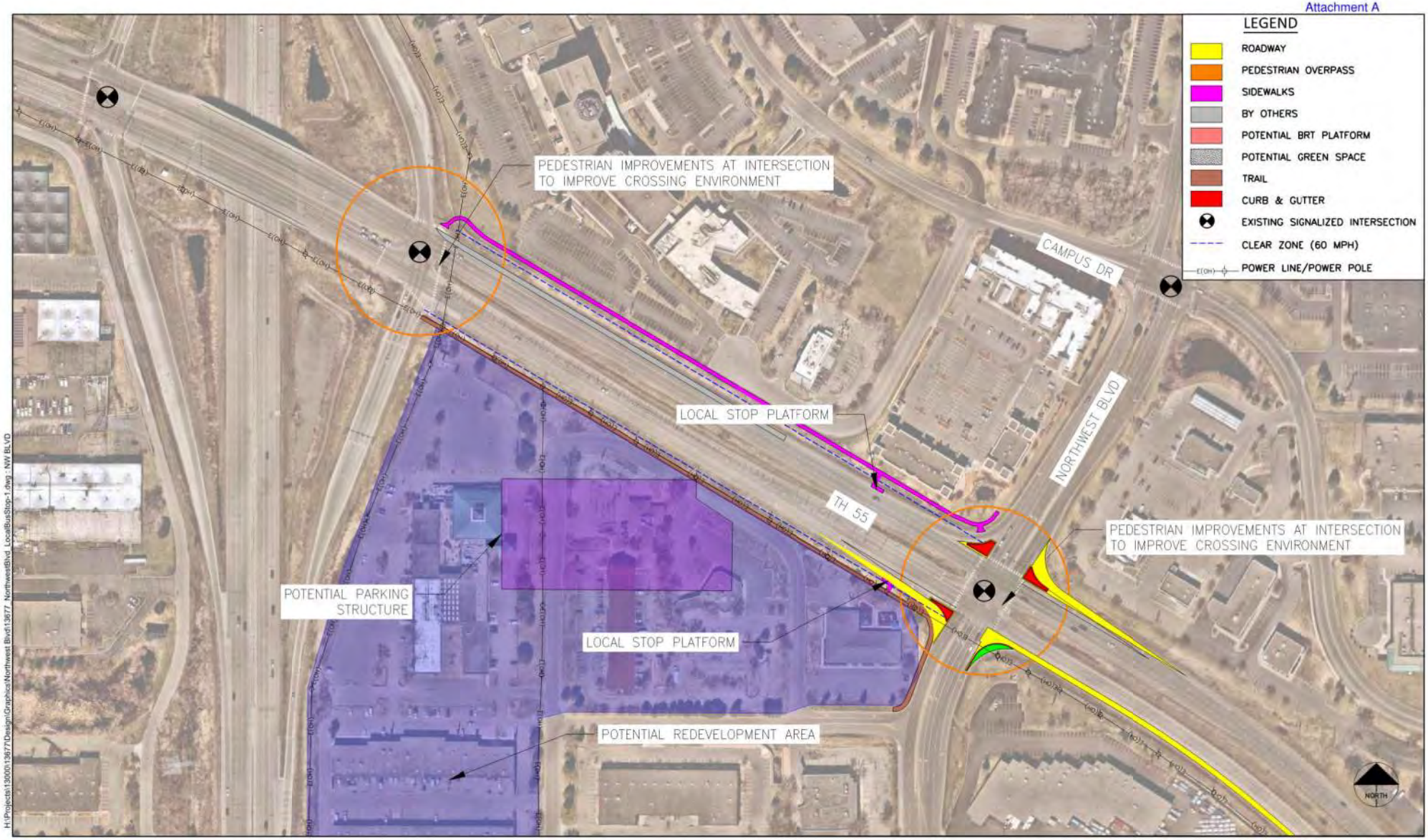

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TH 55 BRT
NORTHWEST BOULEVARD - OPTION 2

Figure 7

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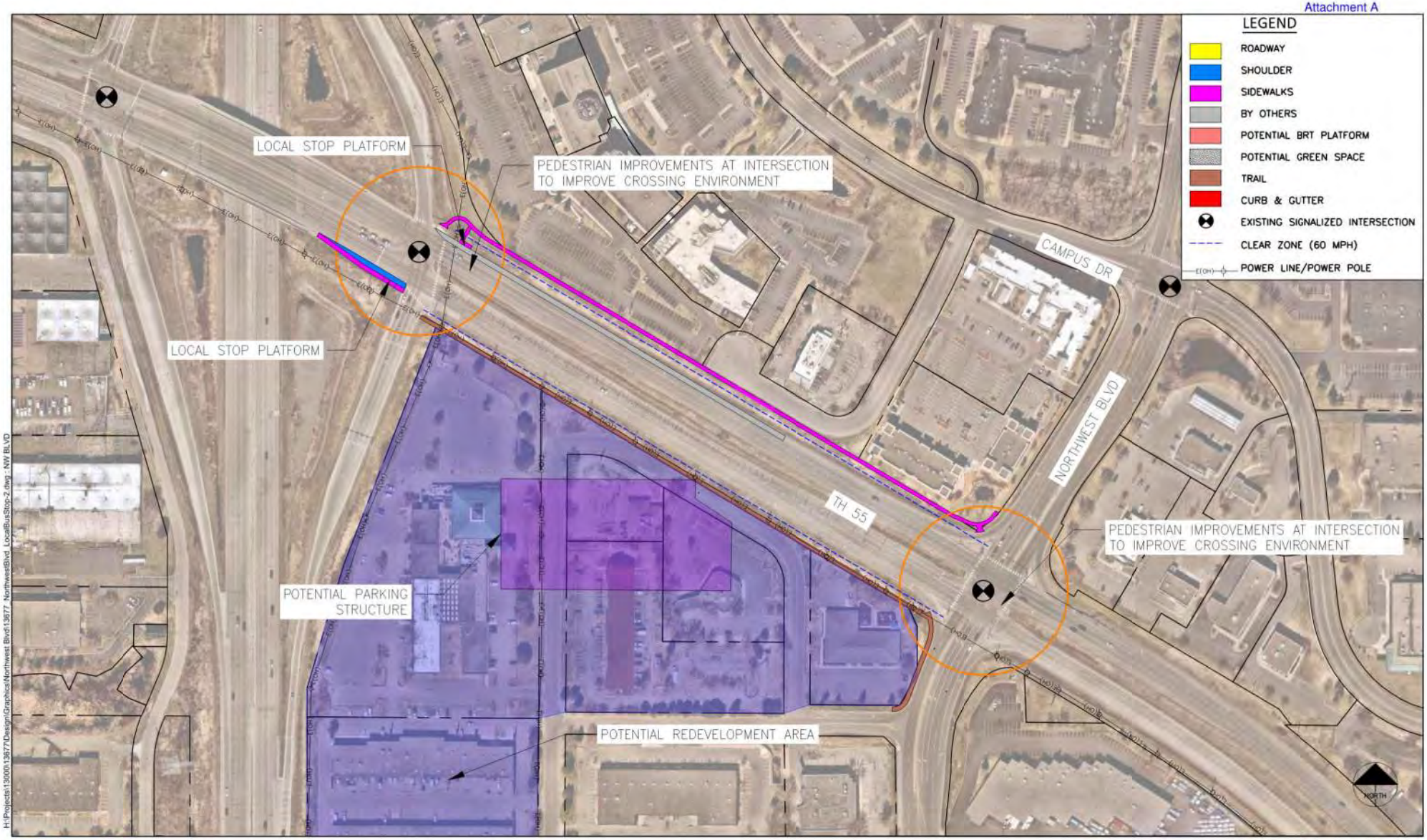

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TH 55 BRT
NORTHWEST BOULEVARD - OPTION 3

Figure 8

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Station 73

Existing Conditions

The Station 73 BRT station would be sited in conjunction with the existing Station 73 Park and Ride facility at the southeast corner of the TH 55 and South Shore Drive intersection. In the northeast corner, a frontage road connects several local businesses via an access from WB TH 55. Three Rivers Park District (TRPD) is exploring the area for a potential north-south connection of a multi-use trail. In addition, several parcels in the vicinity have potential redevelopment plans. The park and ride facility currently has only off-line connections and does not connect directly with TH 55. Overhead power lines cross TH 55 along South Shore Drive, so pedestrian and intersection improvements may require some relocation of electric utilities.

Option 1 – In Line Station with Overpass

This concept includes the construction of platforms would be placed on both sides of the highway with connections to the trail and local pedestrian infrastructure. A pedestrian overpass of TH 55 would connect from the existing park and ride to a new vertical circulation building on the other side of the Highway. In addition, deceleration and acceleration lanes would be constructed in both directions to ensure proper bus maneuvering. To accommodate TRPD trail users, structured ramp connections could be made to the pedestrian overpass. (See Figure 9)

Option 2 – In Line Station with Underpass

An option for this station is an underpass trail connection that would be located slightly to the east of the current park and ride facility. This trail would connect with TRPD trails and make the connection safely without an at-grade crossing of TH 55. Platforms would be placed on both sides of the highway with connections to the trail and local pedestrian infrastructure. The frontage road connection to TH 55 would be closed and converted into a cul-de-sac to improve pedestrian and bicycle safety. There is also a large overhead sign that would be removed in placement of the cul-de-sac. In addition, deceleration and acceleration lanes would be constructed in both directions to ensure proper bus maneuvering.

To make the underpass feasible, roadway grade would be elevated to go over the trail, which would be placed at the approximate existing grade as the frontage road to the north. To accommodate the changed roadway grade, the highway will be reconstructed where the profile will raise, and several retaining walls will need to be constructed along TH 55 to ensure adequate soil and fill stability. These walls would be located on the outsides of the highway, as well as along the trail underneath the highway. Bridges would be constructed in both directions of travel where the roadway passes over the trail connection. Guardrail will be installed to shield from retaining wall hazards in the clear zone.

This concept includes bridges over the trail to provide clear sightlines and natural light to the transit and trail users. (See Figure 10)

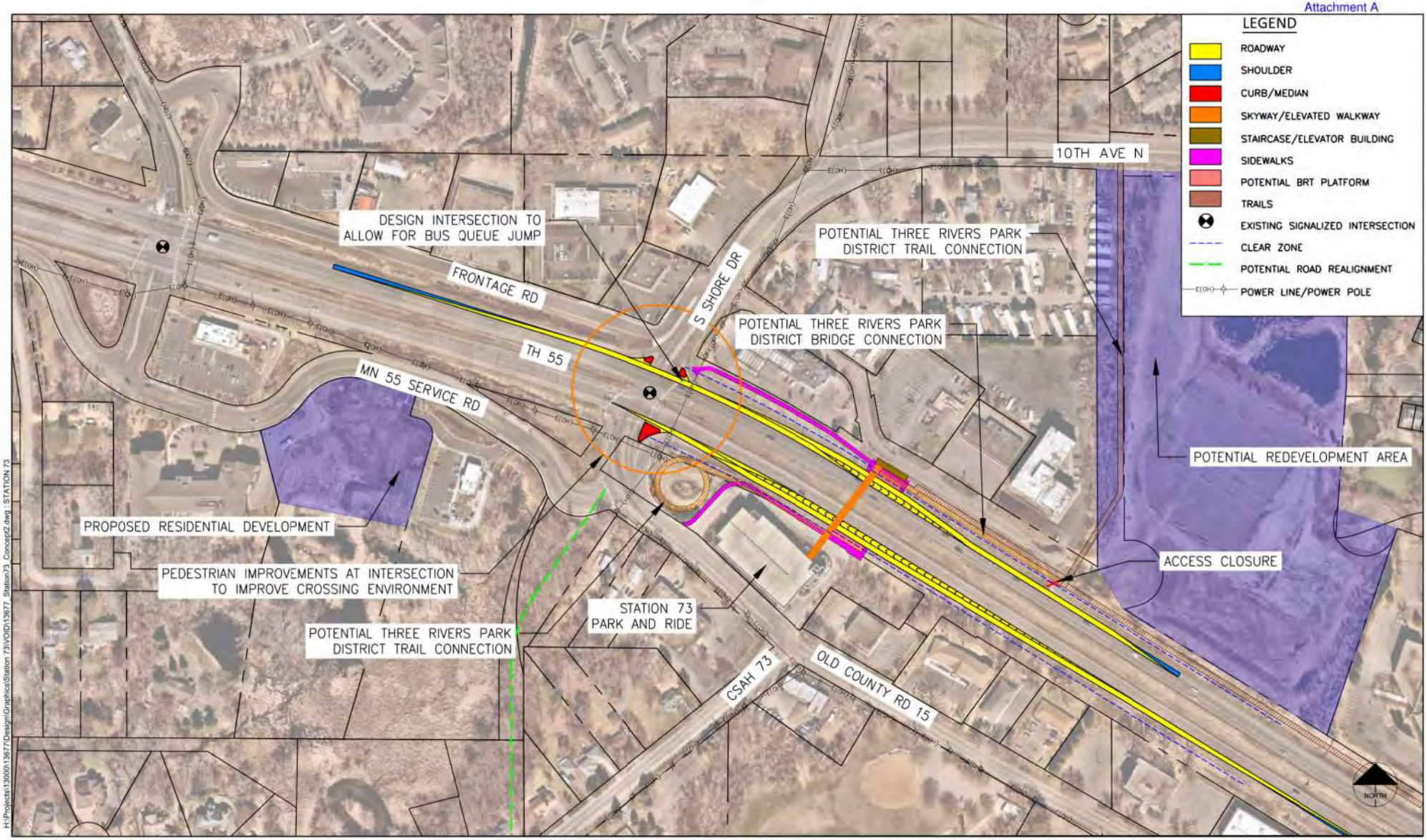
Recommendation

With the planned improvements to TH 55 by MnDOT and the planned crossing of TH 55 by TRPD there is near term support for pedestrian improvements in this area. Option 2 provides for the easiest integration of TRPD trail access and does not require any additional building construction. The recommendation is to proceed with Option 2 and to initiate collaboration with both MnDOT and TRPD to coordinate the funding, ongoing ownership, and maintenance of these improvements. In addition to supporting the future route 757 and potential BRT, the platform and underpass improvements will support and improve current Plymouth Metrolink service.

If the route 757 will be implemented before the construction of inline station platforms, the local stop can occur within the Station 73 park and ride site.

If agreements cannot be made between the City of Plymouth, MnDOT and TRPD on the funding, ownership and maintenance of Option 2, the potential BRT project can evaluate implementing Option 1.

Attachment A



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TH 55 BRT
STATION 73 - OPTION 1

Figure 9

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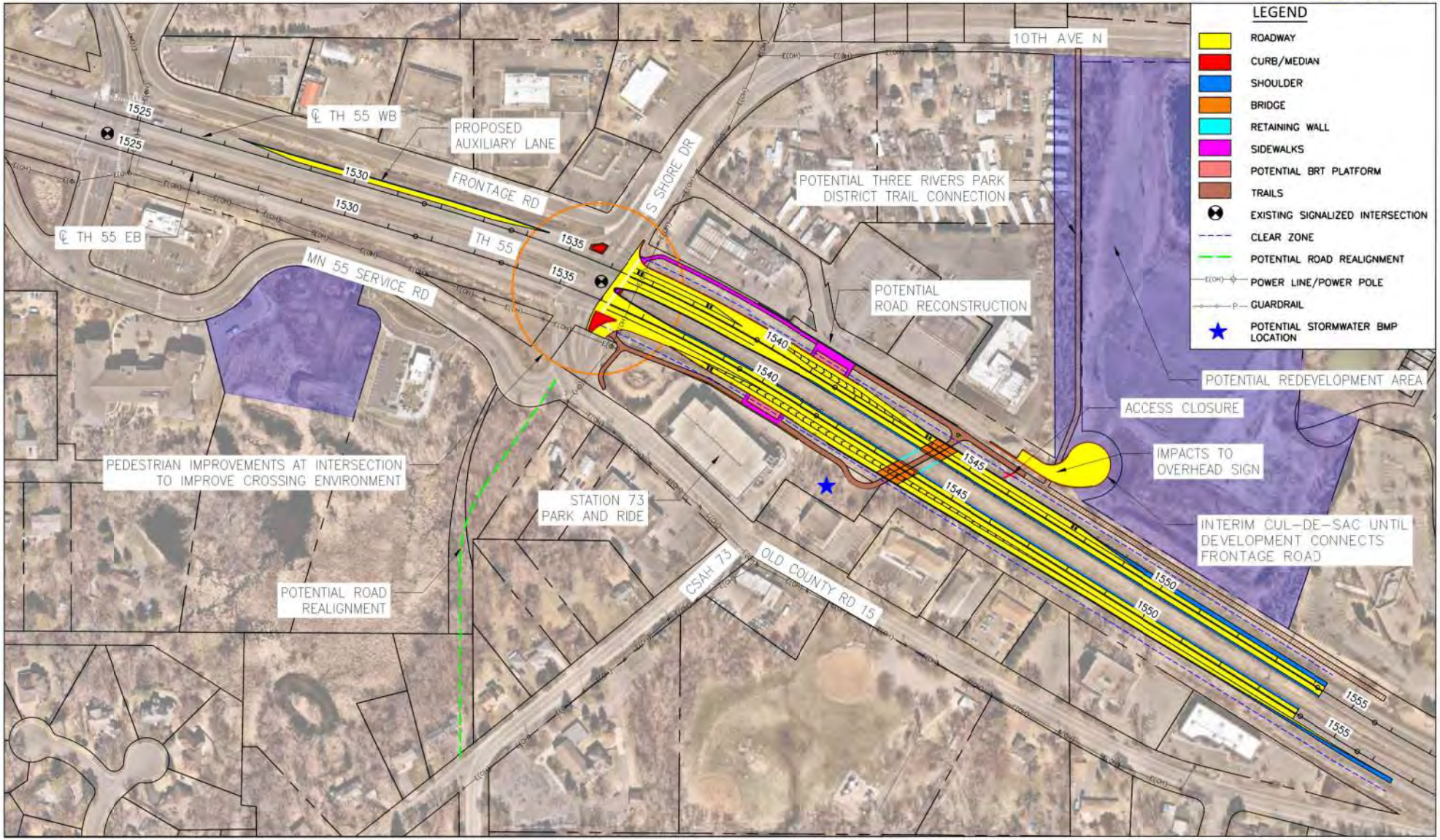
Attachment A



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TH55 BRT
STATION 73 - OPTION 2

Figure 10

NORTH

0 50 100 200

Ford Road

Existing Conditions

The City of Plymouth and the City of St. Louis Park share a municipal boundary along Shelard Parkway near TH 169. This site lies between several important corridors: TH 169, TH 394, and TH 55 and is in close proximity to high density residential and office space. This location is not currently included in the proposed route 757 but may be considered as part of a route deviation to serve the General Mills corporate campus. Metro Transit route 645 currently stops at this intersection. The existing WB stop is currently not ADA accessible.

Option 1 – BRT

The first option includes BRT service in this area, with both platforms along Shelard Parkway just to the west of the intersection with Ford Road. The westbound station would include a pedestrian connection and crosswalk to the existing sidewalk on the south side of Shelard Parkway. The eastbound station would be placed along the existing sidewalk within the right-of-way. A retaining wall would be required for the westbound station. (See Figure 11)

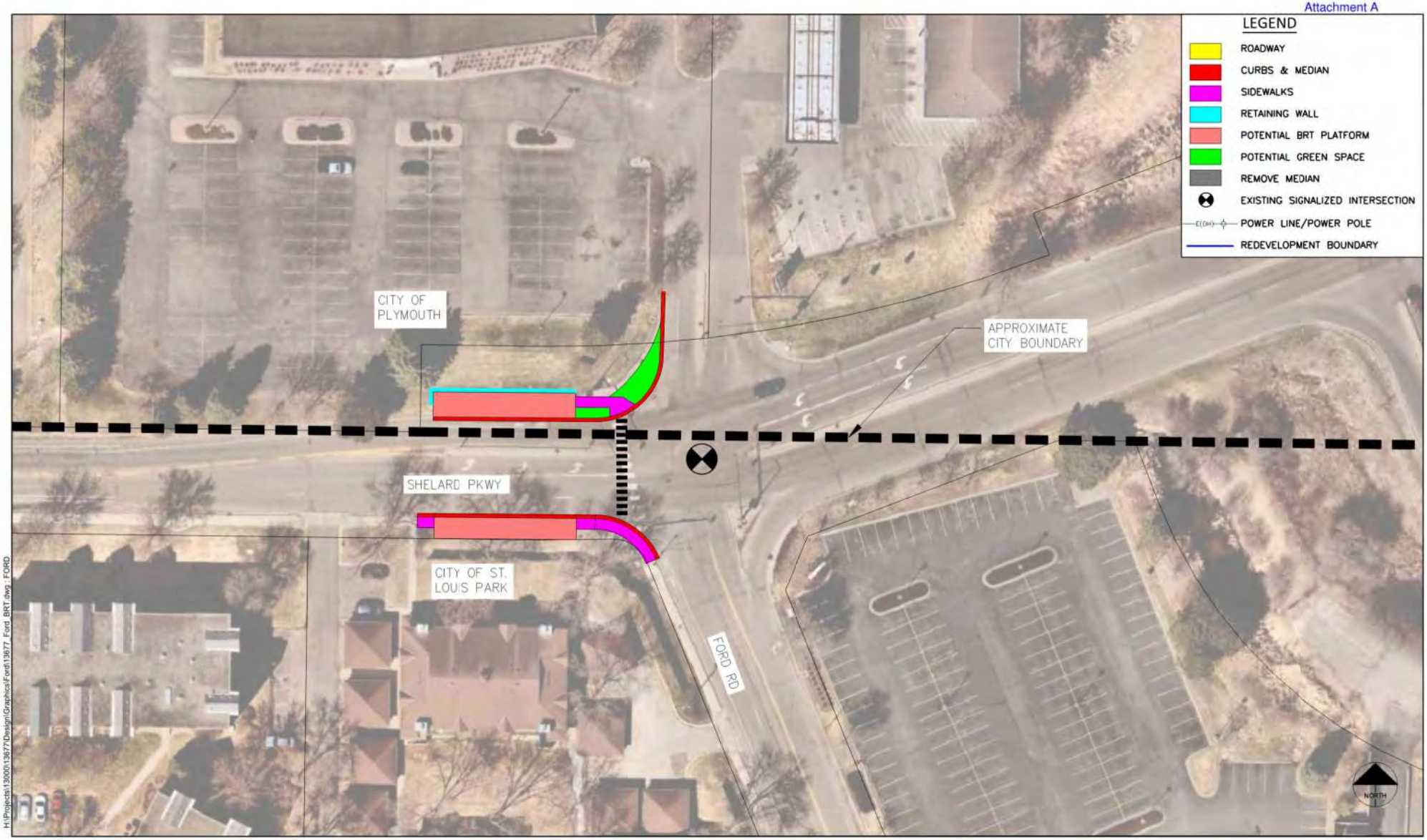
Option 2 – Local Stop Only

The second option is very similar to the BRT option with many of the same improvements. Platform sizes would be smaller due to only supporting local service, but this option would still include improved pedestrian facilities, a retaining wall, and curb replacements. Both platforms would be located to the west of the Shelard Parkway and Ford Road intersection. (See Figure 12)

Recommendation

To improve pedestrian access to transit and pedestrian safety at the intersection of Ford Road with Shelard Parkway it is recommended that the Cities of Plymouth and St. Louis Park collaborate on an improvement project to implement Option 2 which will provide immediate benefit to route 645 and possible benefit to future route 757. If redevelopment occurs on the North side of Shelard Parkway, considerations should be made future BRT accommodations.

Attachment A



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TH 55 BRT
FORD - OPTION 1

Figure 11

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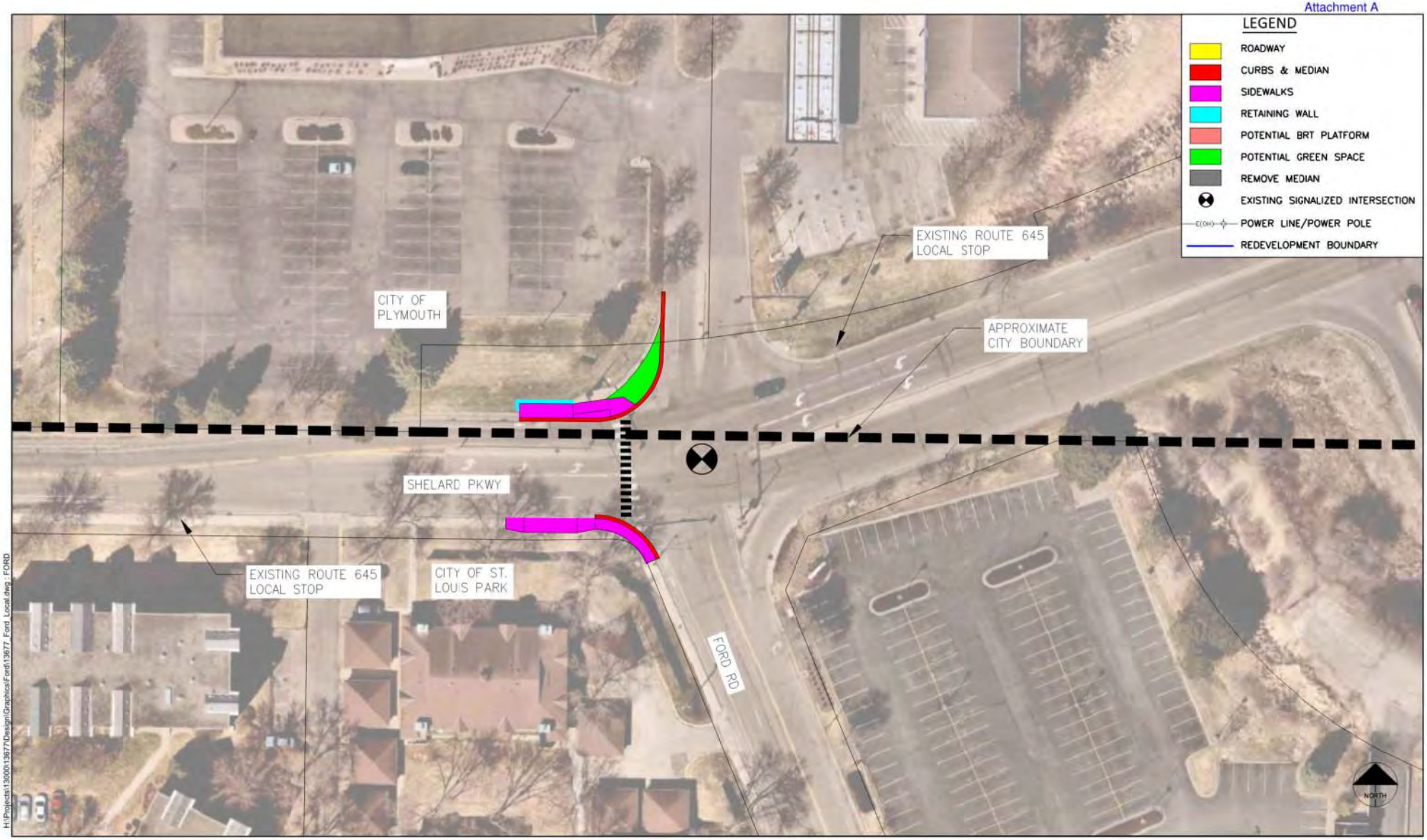
Attachment A



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TH 55 BRT
FORD - OPTION 2

Figure 12

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Attachment B

HWY 55 BRT STUDY

STATION AREA PLANNING

LAND USE AND BICYCLE AND PEDESTRIAN NETWORK

SRF

JUNE 18, 2021

Study Approach

As new Route 757 express bus service is implemented between Plymouth and Downtown Minneapolis, with the potential for it to evolve into BRT service eventually, comprehensive planning at each planned station area will create more transit-supportive surroundings. Both land use and the bicycle and pedestrian network are key aspects of the physical environment that must be guided to achieve both community and regional goals. Ultimately, station areas and transit service should strive for a symbiotic relationship - creating supportive residential and commercial density, convenient and safe circulation routes, and an attractive sense of place.

With respect to land use, this memo aims to provide a portrait of each station area that highlights key destinations and summarizes the predominant land use orientation. For the purposes of this study, "station area" is defined as a one-half mile radius from the proposed station location which approximately equates to a ten-minute walking distance. For each of the five station areas, a brief physical description is paired with photos of existing surroundings. Additionally, maps of existing and planned land use illustrate the current and planned overview conditions that are identified in the City's 2040 Comprehensive Plan. Locations where the study team identified potential change between existing and planned uses are flagged.

For the bicycle and pedestrian network, this memo builds upon the existing and planned networks at both the city and regional levels. A number of planned routes are already envisioned with station areas that would add dedicated trails to current roadways or complete linkages in the Regional Bicycle Transportation Network. Rather than scrutinizing all potential bicycle and pedestrian routes within the station areas, the study team focused on identifying several key tangible opportunities where existing barriers to safe and continuous movement exists or where the modal accommodations can be diversified to improve station access. For instance, this might include a suite of pedestrian crossing improvements at a particular intersection, completing a key gap in continuity, or upgrading a narrower facility to a wider multi-use path.

Figure 1: Commercial and civic destinations at City Center

Regional Transit-Oriented Development (TOD) Guidelines

Summary of Metropolitan Council Guidelines

To prepare for BRT, local governments must plan for higher levels of activity and residential density. Density recommendations are based on community designations. This study assumes that the proposed BRT corridor and station areas fall under the "Suburban" designation.

Metropolitan Council suggests implementing a diversity of activity within the proposed station area, including residential, employment destinations, retail, schools, public green space, and entertainment opportunities. **7,000 people from any combination of these activities** will support a proposed BRT station.

The average minimum residential density requirements for new development within the BRT station areas is a **minimum of 10 units/acre; with a target of 20-40+ units/acre.** Plymouth's Living Area 3 (6-12 units / acre), Living Area 4 (12-20 units / acre), Living Area 5 (20-60 units / acre), and Mixed-Use Residential (12-25 units / acre) meet this density requirement.

Each station presents an opportunity to create a new community focal point. Rather than seeking a one-size-fits-all approach to station area planning, local governments should consider each proposed station's planned and existing land uses, destinations, and character. When possible, the city should promote complimentary land uses, such as retail with high-density residential.

Metropolitan Council's TOD Guidance – Near Term Recommendations

- Consider interim overlay zoning district
- Develop vision for station areas
- Initiate agency coordination
- Guide medium and high-density housing with a mix of affordability
- Adopt community-wide policies for complete streets
- Identify needed local transportation improvements

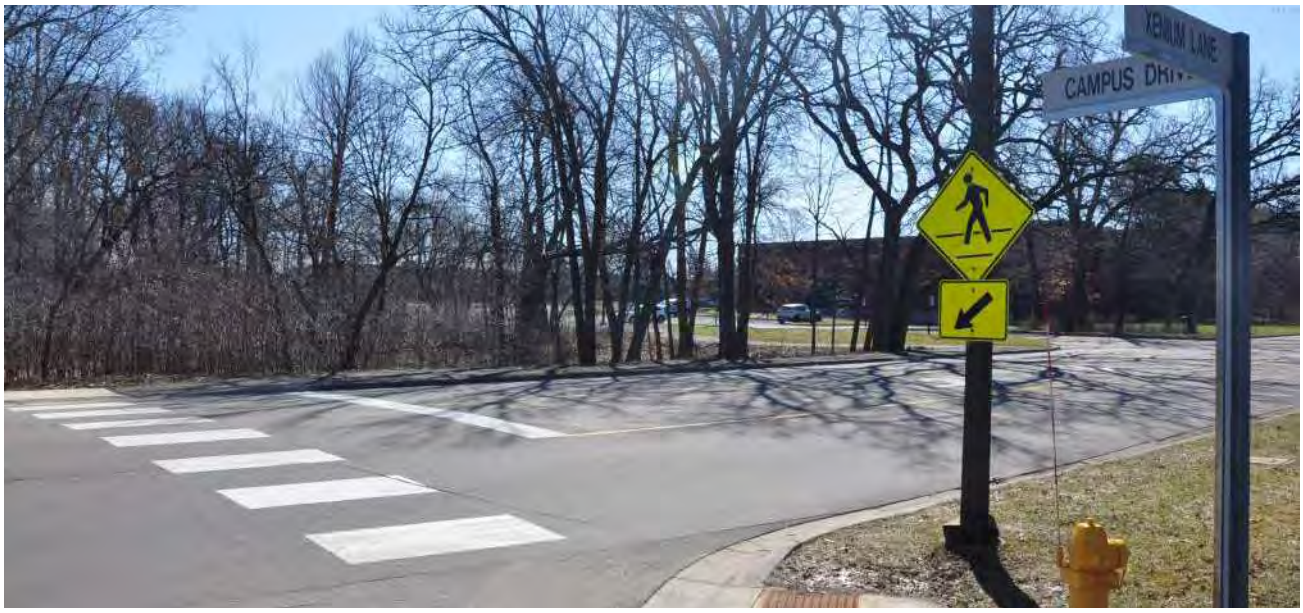


Figure 2: Existing pedestrian infrastructure and natural resources in Northwest Boulevard station area

Proposed Route and BRT Station Areas

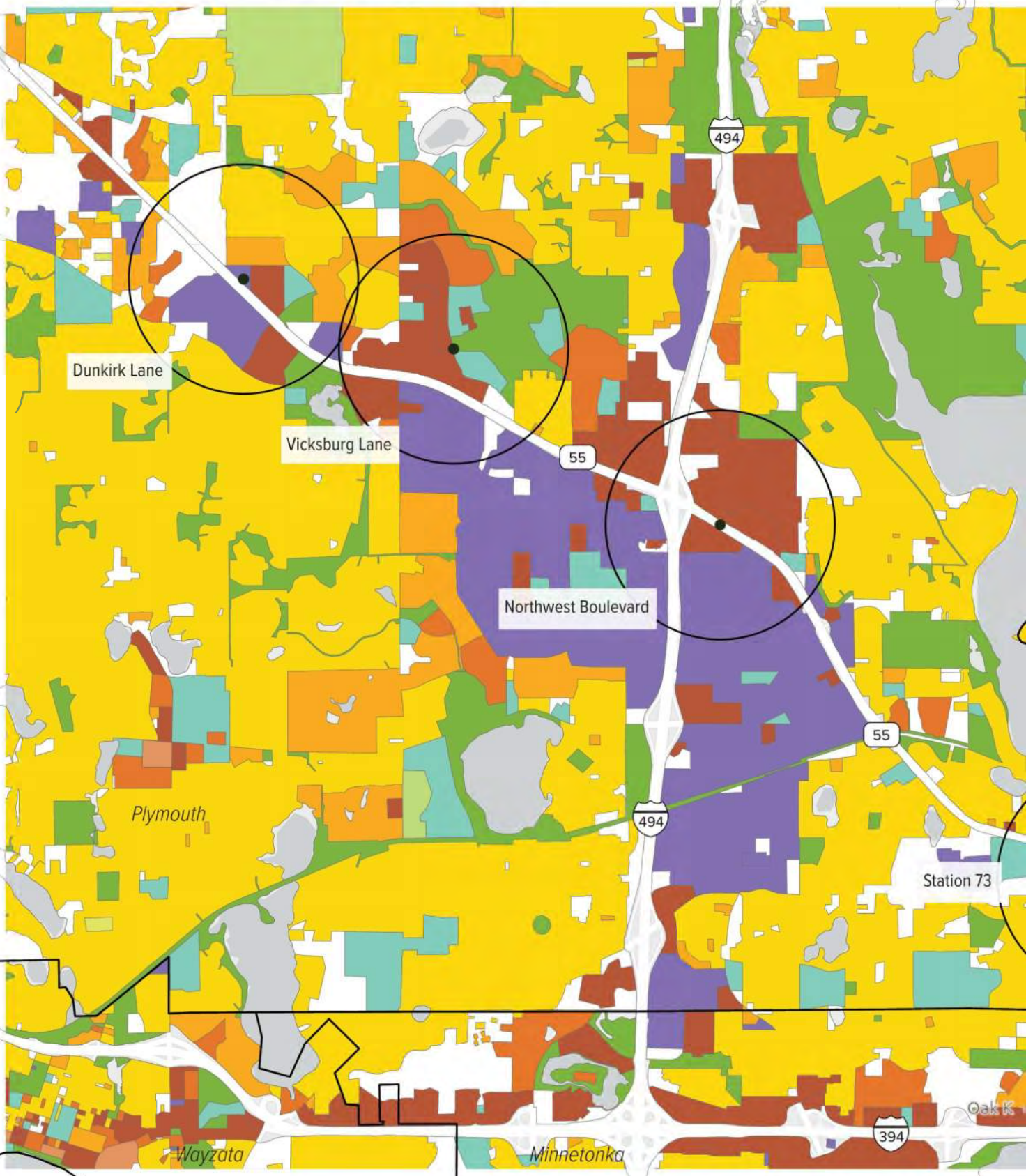
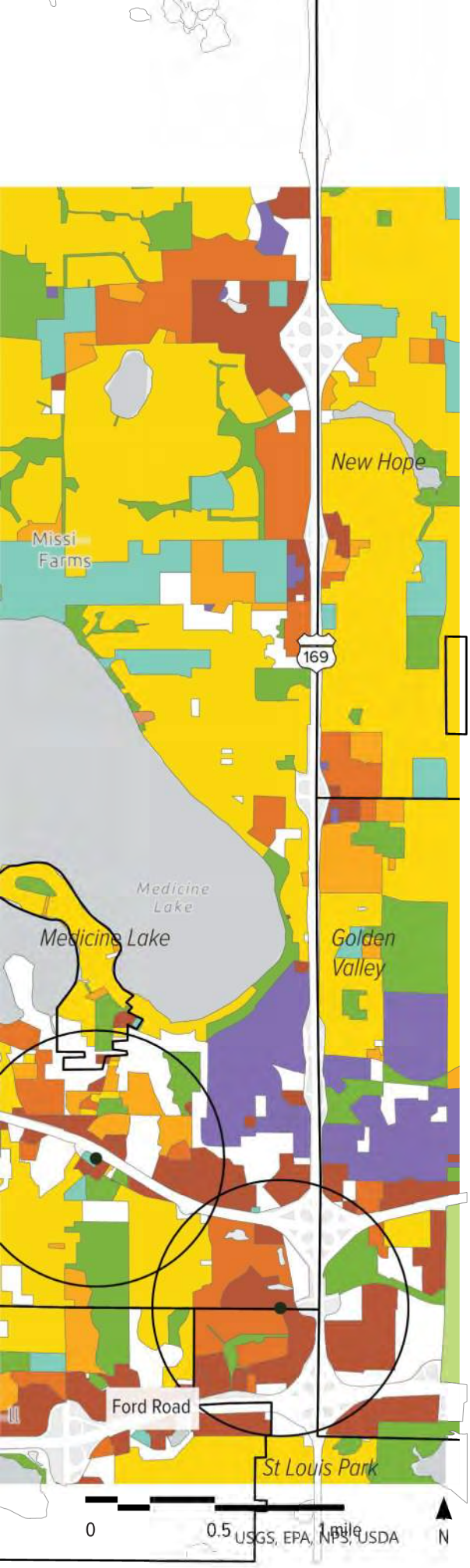


Figure 3: Existing General Land Use



Metro Transit Route 757 and the potential BRT route will travel along Highway 55 to downtown Minneapolis. It will serve both Plymouth residents and employees of Plymouth businesses who live closer to the urban core, and provide access to public facilities such as the Hennepin County Library and City Hall.

The proposed route includes potential stations at Dunkirk Lane, Vicksburg Lane, Northwest Boulevard, Station 73, and the possibility of adding a station at Ford Road. All of these stations are within 1/2 mile of Highway 55. Each has its own mix of existing land uses but follow the city-wide pattern. Plymouth's overall zoning tends to concentrate commercial, multifamily, and industrial zoning along Highway 55 and I-394; with lower density residential away from major thoroughfares.

The existing combination of retail, employment, recreation, and housing along Highway 55 is poised to generate the activity necessary to support a highway BRT route with opportunity for additional density. By promoting Metropolitan Council's transit-oriented development guidelines for new construction when redevelopment proposals arrive, Plymouth can increase density and walkability along the Highway 55 corridor. This can attract new businesses and residents and increase activity in station areas, while preserving natural areas and maintaining a more suburban, single-family residential feel outside of this denser nodes.

BRT Stations
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ity_Boundary
LUSE_DESC
hway
Major Railway
Manufactured
Mixed Use Cor
Mixed Use Cor
Mixed Use Ind
Mixed Use Res
Multifamily
Office
Water

Existing General Land Use

- Single Family Detached
- Single Family Attached
- Multifamily
- Mixed Use
- Commercial and Office
- Industrial and Utility
- Institutional
- Parks and Open Space
- Golf Course
- Agricultural
- Railway
- Undeveloped

- Proposed BRT Stations
- 1/2 Mile Station Area
- Municipal Boundary

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Proposed Route: Bicycle and Pedestrian Connectivity

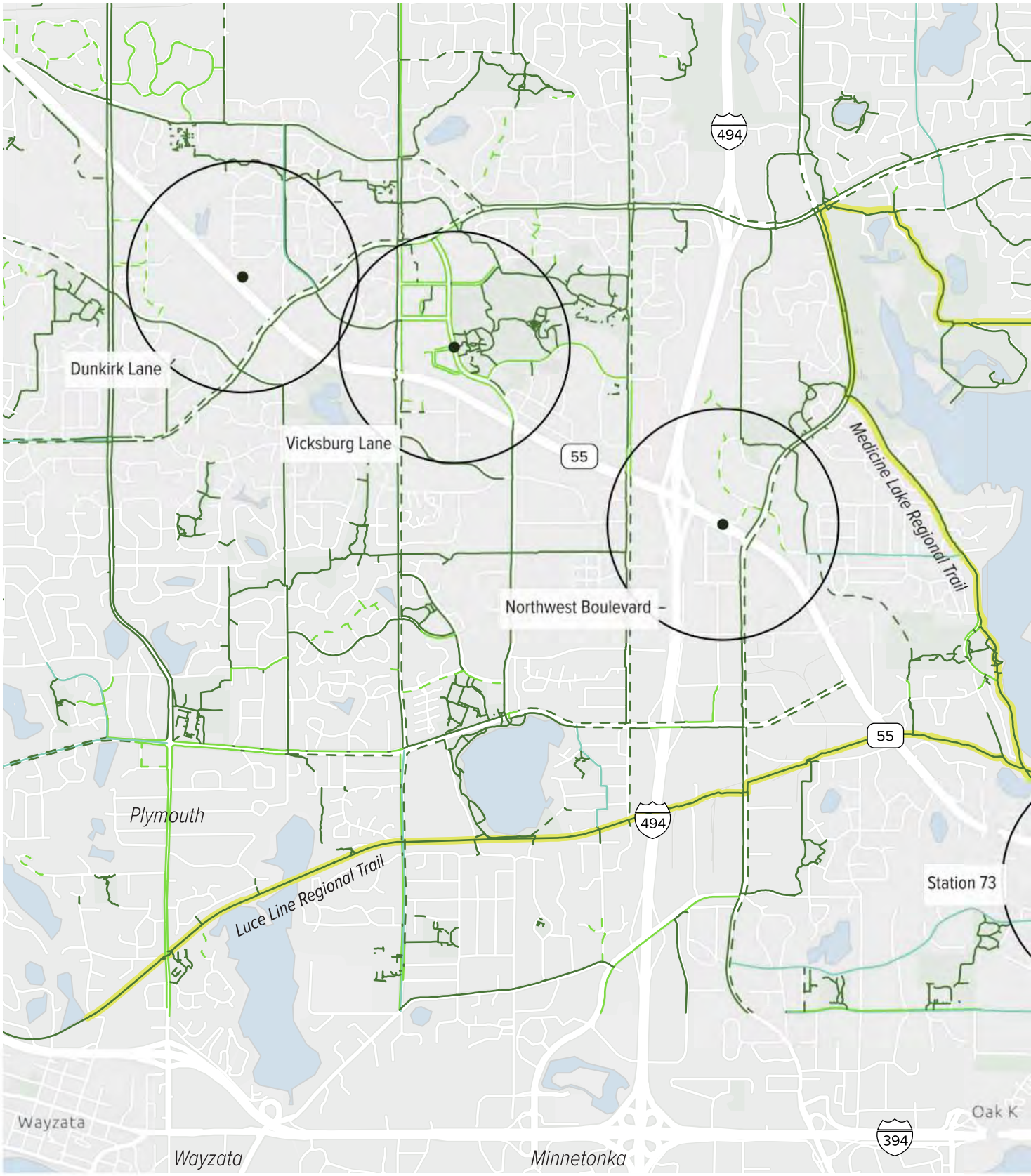
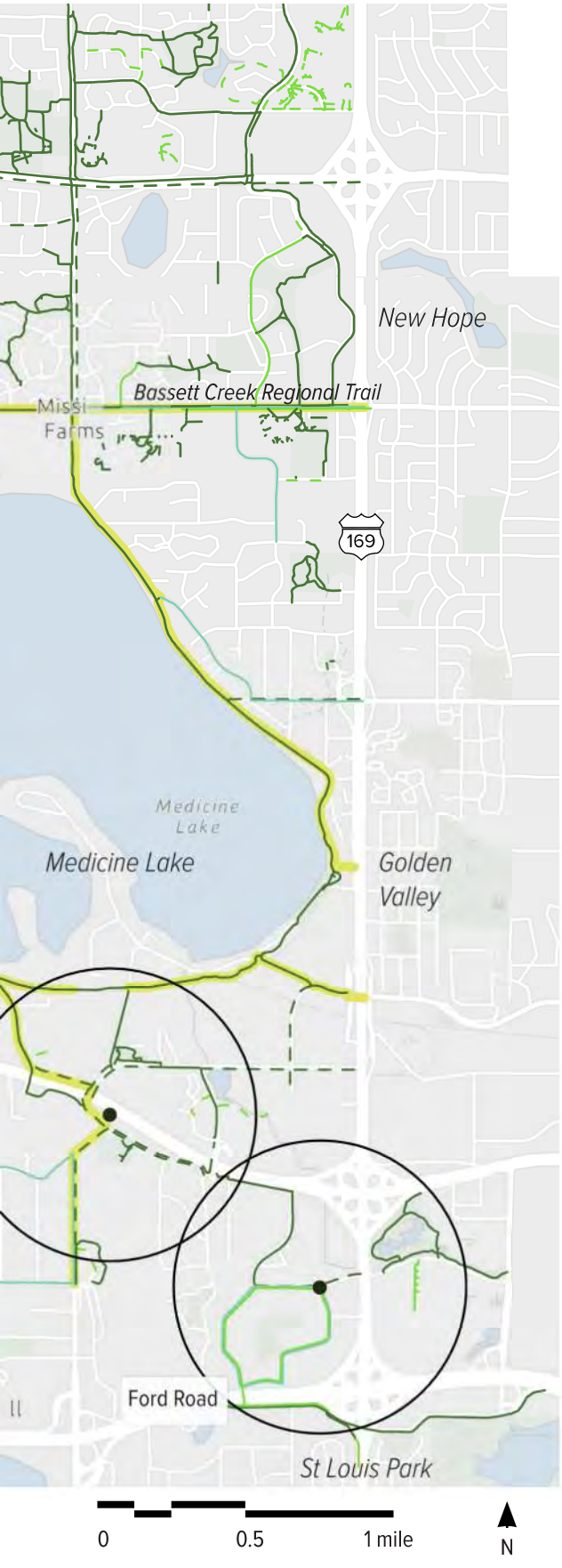


Figure 4: Existing and Proposed Bicycle and Pedestrian Infrastructure



Continuous routes, safe facilities, and interconnected networks for bicyclists and pedestrians allow more people to take advantage of rapid transit routes. The City of Plymouth's existing sidewalk and trail network supports recreation, commuting, and active living, with an emphasis on off-road multi-use trails. Nevertheless, existing bicycle and pedestrian facilities along roadway corridors in station areas currently have gaps, and major thoroughfares create barriers that discourage non-motorized trips.

The Luce Line Regional Trail, Medicine Lake Regional Trail, and Bassett Creek Regional Trail converge near the proposed Station 73 station. These routes are key alignments on Metropolitan Council's Regional Bicycle Transportation Network, used to prioritize an arterial bicycle network by connecting regional destinations and local bicycle networks.

Dedicated space for bicycle and pedestrian facilities will improve the streetscape for all users. Increasing connectivity and alleviating safety concerns in currently auto-focused environments within the ½ mile station area will improve access to BRT service. This memo outlines targeted interventions building on previous citywide comprehensive planning to improve the safety and experience of transit users approaching the station on bicycle or by foot.

RBTNAlign
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Bicycle and Pedestrian Infrastructure

- Existing Sidewalk
- Proposed Sidewalk
- Existing Trail
- Proposed Trail
- Existing On-Road Bike Route
- Regional Bicycle Transportation Network Alignment

- Proposed BRT Stations
- 1/2 Mile Station Area

Dunkirk Lane

Context and Character

The Dunkirk Lane Station is planned as a park and ride site at the terminus of the proposed BRT route. Commerical development near the proposed station area is primarily auto-oriented. South of highway 55, uses include light industrial. A larger percentage of land use in the station area is devoted to lower-density, single-family detached housing. The station area also contains a signifcant area of natural resources, including wetland systems and wooded areas.

Primary Destinations

- Hy-Vee Grocery Store
- Plymouth Ponds Business Park
- Plymouth Presbyterian Church
- Urban Air (entertainment venue)

Figure 5: Auto-oriented commercial development south of Highway 55.

Figure 6: Lower-density residential development south of Highway 55.

Figure 7: Dundee Nursery, adjacent to potential station location. Potential property redevelopment is currently under review.

Dunkirk Lane: Existing Land Use

Figure 8: General land use in Dunkirk Lane station area

There is a mix of uses at the proposed station location, including retail, office / commercial, and light industrial. The edges of the 1/2 mile station area are dominated by lower-density residential, parks, and wetlands.

	% Total Land Area
Single Family Detached	32%
Single Family Attached	16%
Multifamily	2%
Commercial and Office	8%
Industrial and Utility	16%
Institutional	2%
Parks and Open Space	4%
Undeveloped	20%

Dunkirk Lane: Planned Land Use

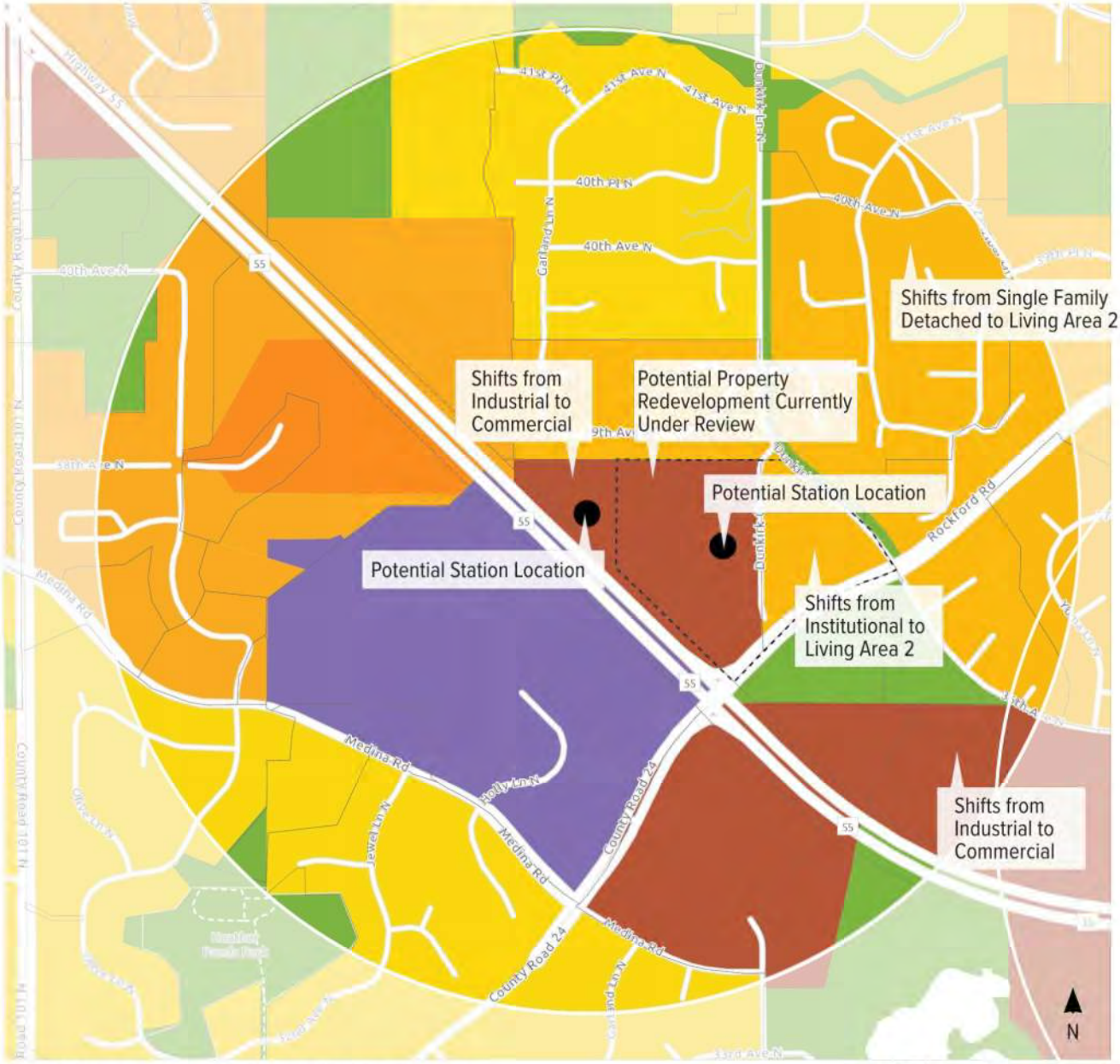


Figure 9: Planned land use in Dunkirk Lane station area

Industrial areas are relocated south of Highway 55 and east of Rockford Road, consolidating a commercial zone around the proposed station location. This creates an opportunity for commercial and retail destinations with a more walkable streetscape directly around the Dunkrik station. Residential zoning at the east end of the station area shifts from Single Family Detached to Living Area 2, an increase in density more supportive of Transit-Oriented Development.

Vicksburg Lane / City Center

Context and Character

Several alternate station locations are being considered for this area at this point in the planning process. All are located in Plymouth's City Center. Development guidelines for City Center 2.0 include a community gathering space and a restaurant cluster. The plan also envisions a more pedestrian-oriented environment, with park-like use, increased night life, and cohesive mixed-use with new living options closer to the heart of the city. The recommendations in this memo build off City Center 2.0 recommendations.

A mix of commercial / retail, public buildings, and parks would surround the proposed station. East of the proposed location, the Hilde Performance Center and Plymouth Creek Park offer public gathering spaces and natural areas. As highlighted in the City Center 2.0 plan, opportunity sites could be redeveloped with buildings that orient towards the street to enhance the public realm and deemphasize the prominence of surface parking. Plymouth Boulevard provides an attractive route through the station area, connecting to a robust sidewalk network to the north. A trail along Vicksburg Lane creates north-south connections to residential and industrial zones beyond the station area.

Primary Destinations

- Hennepin County Library
- Hilde Performance Center
- Cub Grocery Store
- Lifetime Fitness
- Plymouth Ice Center
- Plymouth Grand 15 (theater)
- Retail
- Restaurants
- Medical office
- Lunds & Byerly's
- Lowe's Home Improvement
- Good Will

Figure 10: City Center gateway.

Figure 11: TOD-supportive development and streetscape character.

Figure 12: Restaurant hub and sidewalk on 35th Avenue alignment.

Vicksburg Lane/City Center: Existing Land Use

Figure 13: General land use in Vicksburg Lane/City Center station area

	% Total Land Area
Single Family Detached	12%
Single Family Attached	3%
Multifamily	8%
Commercial and Office	25%
Industrial and Utility	15%
Institutional	10%
Parks and Open Space	20%
Undeveloped	5%

The Vicksburg Lane station area has a large percentage of land dedicated to commercial / office, open space, and institutional uses. Ridership will only increase as this commercial hub transforms into City Center 2.0. The station could serve retail, office, and government employees as well as people visiting parks, shopping, eating at restaurants, and attending sports and cultural events.

The industrial zone south of Highway 55 is less dense, with fewer destinations for potential BRT riders. Existing businesses in this area are auto-oriented. There are additional lower density residential areas at the north and south periphery of the station area.

Vicksburg Lane/City Center: Planned Land Use

Figure 14: Planned land use in Vicksburg Lane/City Center station area

Many commercial and institutional properties are zoned 'City Center,' which includes additional streetscape design guidelines. For example, building entrances should relate to streets rather than parking lots, and pedestrian-scale lighting, plantings, and amenities should create a distinct City Center visual identity.

A large area currently zoned 'Single Family Detached' shifts to 'Living Area 2.' Plymouth's 2040 comprehensive plan notes that 'Living Area 2' provides smaller homes on smaller lots, including townhomes. This option is lower-cost and easier to maintain than typical detached homes, providing potential life-cycle housing for people purchasing a first home or as they age.

Vicksburg Lane/City Center: Existing Bike/Ped Network

Figure 15: Existing bicycle/pedestrian infrastructure in Vicksburg Lane/City Center station area

The Vickburg Lane / City Center station area has a strong existing pedestrian network. However, the large number of auto-oriented businesses - including Cub Foods and Plymouth Grand 15 - creates an expanse of surface parking between Vicksburg Lane and the proposed BRT station, which could be uncomfortable for cyclists and pedestrians to navigate.

A trail along Plymouth Boulevard south of Highway 55 connects cyclists to the station area. However, the crossing at Plymouth Boulevard and Highway 55 is difficult for less experienced cyclists and pedestrians with limited mobility. The trail also transitions to a sidewalk at this point, leaving no dedicated bicycle facility between TH 55 and Rockford Road.

1 Surface parking creates a barrier for cyclists and pedestrians travelling on Vicksburg Lane to the proposed station location.

2 A sidewalk only on Plymouth Boulevard creates potential conflicts between cyclists and pedestrians. Fast traffic could feel unsafe to cyclists on the street.

3 At-grade intersection crossings Vicksburg Lane//Plymouth Boulevard and Highway 55 could feel unsafe to pedestrians and cyclists.

Vicksburg Lane/City Center: Recommended Bike/Ped Improvements

Figure 16: Proposed bicycle/pedestrian improvements in Vicksburg Lane/City Center station area

Creating a direct route for cyclists and pedestrians along the 35th Avenue alignment between Vicksburg Lane and Plymouth Boulevard will improve station connectivity while creating human-scale blocks within the station area. This route could enhance placemaking through streetscape improvements –including pedestrian lighting, plantings, and public space - within City Center 2.0.

Implementing pedestrian safety measures at Vicksburg Lane and Highway 55 and Plymouth Boulevard / Niagra Lane and Highway 55 will strengthen the existing north-south trail connectivity to the station area. A dedicated bicycle facility along Plymouth Boulevard will improve the experience for people walking, cycling, driving, and riding for transit in the City Center 2.0 core.

- Existing Sidewalk
- Proposed Sidewalk
- Additional Proposed Sidewalk
- Existing Trail
- Proposed Trail
- Additional Proposed Trail
- Priority Bicycle and Pedestrian Station Access Routes

"Proposed Sidewalk" and "Proposed Trail" refer to infrastructure recommended in Plymouth's 2040 Comprehensive Plan. "Additional Proposed Sidewalk" and "Additional Proposed Trail" refer to infrastructure recommended by this study.

1 Create direct pedestrian and bicycle route from Vicksburg Lane, along 35th Avenue alignment through surface parking to proposed station location along Plymouth Boulevard.

2 Widen existing walk on east side to a multi-use trail along Plymouth Boulevard to create continuous bike route through proposed City Center.

3 Implement pedestrian crossing safety measures, such as eliminating channelized right turns and adding center median refuges, at Hwy 55/Vicksburg Ln and Hwy 55/Plymouth Boulevard/Niagra Lane at grade intersections.

Northwest Boulevard

Context and Character

The proposed area has an employment and medical services focus with commercial and light industrial properties occupying most of the hal-mile station area. To the north, there are office centers in large buildings with abundant surface parking. Restaurants and hotels in smaller buildings serve patients, staff, and visitors. South of the Highway 55, uses include single-lot retail and industrial buildings and parking lots. The station area also includes part of Heritage Park, Plymouth creek, and a large strip of wooded green space between lower-density residential areas and the station area.

Primary Destinations

- West Health and other medical offices
- Atria Corporate Center
- Three Rivers Park District Administrative Center
- Residence Inn
- Restaurants
- Offices
- Industrial businesses

Figure 17: Tech campuses along Campus Drive

Figure 18: West Health campus

Figure 19: Frontage road south of Highway 55

Northwest Boulevard: Existing Land Use

Figure 20: General land use in Northwest Boulevard station area

The proposed BRT station would serve employees and visitors of medical centers, corporate campuses, and institutional offices. Hotels and restaurants for patients and families are also popular destinations. The area north of Highway 55 is well-served by existing bus routes, suggesting a demand for public transportation to these destinations. While the current mix of uses in the southeast quadrant of the Highway 55/494 interchange is auto-oriented, a significant mixed-use redevelopment proposal under review would transition the area to more transit-supportive density.

	% Total Land Area
Single Family Detached	14%
Single Family Attached	0.5%
Multifamily	7%
Commercial and Office	34.5%
Industrial and Utility	29%
Institutional	2%
Parks and Open Space	17%
Undeveloped	6%

Northwest Boulevard: Planned Land Use

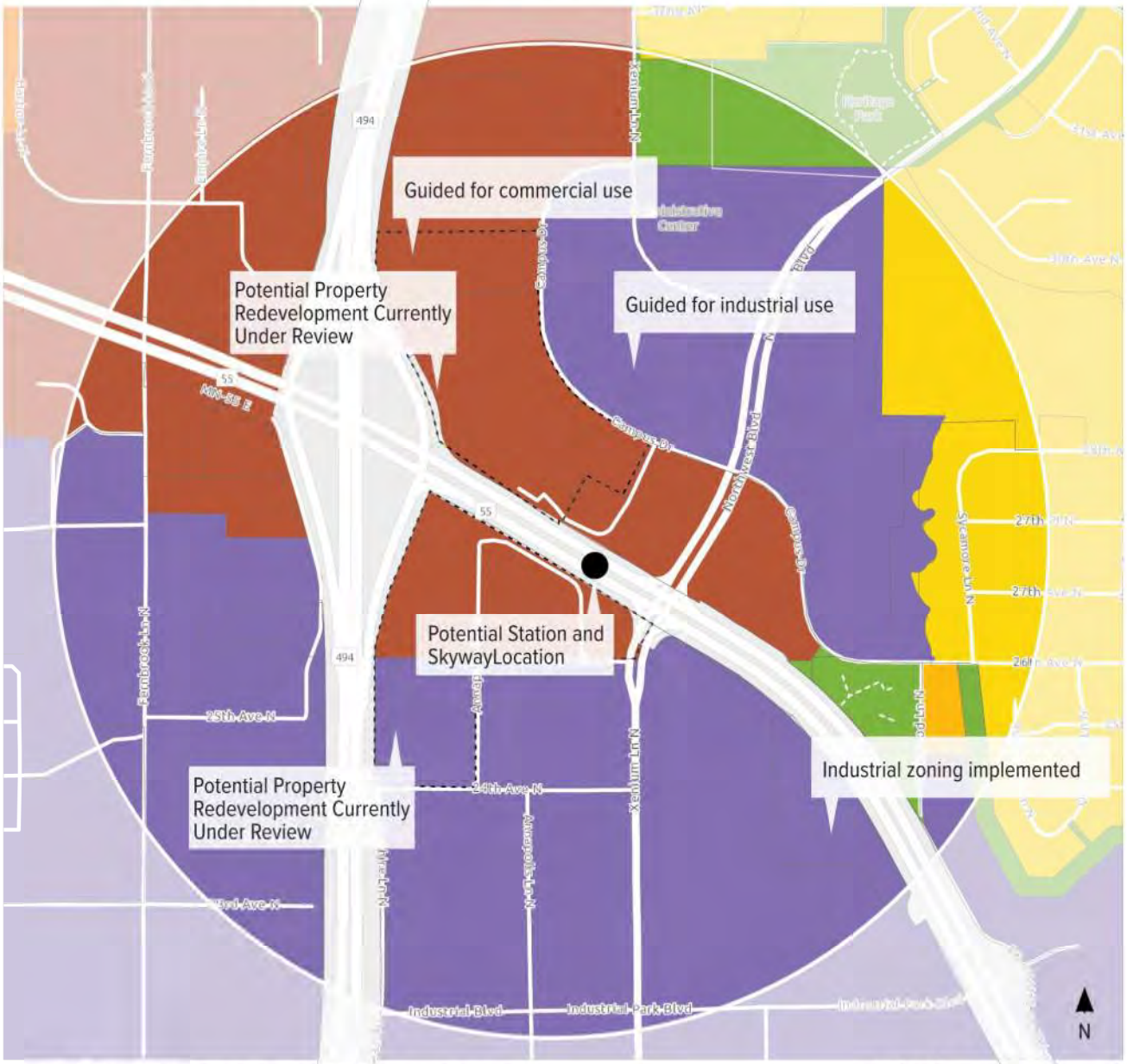


Figure 21: Planned land use in Northwest Boulevard station area

A large area north of Highway 55 changes from commercial and office to Industrial zoning, creating an industrial buffer between commercial / office areas and lower-density residential. Some commercial infill along northbound 494 is proposed. A few smaller parcels south of Highway 55 also shift from industrial to commercial. This creates an overall tighter and denser commercial core directly adjacent to Highway 55, which can support TOD.

Northwest Boulevard: Existing Bike/Ped Network

Figure 22: Existing bicycle/pedestrian infrastructure in Northwest Boulevard station area

Most activity at the Northwest Boulevard station area is centered around medical centers and tech campuses, and the restaurants and retail that serve their staff, students, and visitors. The circulation between these destinations is currently primarily auto-oriented, with some fragmented trail and sidewalk connections.

Existing north-south trails connect to the station area along Fernbrook Lane and Xenium Lane / Highway 61, but no direct east-west trail connects these routes. Existing worn pathways along Highway 55 suggest that pedestrians would use a sidewalk or trail between Highway 61 and I-494. The existing intersection of Highway 55 at Xenium Lane/ Northwest Boulevard is expansive and challenging for cyclists or pedestrians.

1 Campus Drive has several sidewalk / trail gaps, with limited pedestrian crosswalks.

2 Existing trail and sidewalk crossing of TH 55 at Xenium Lane/Northwest Boulevard feels unsafe: long crossing distance, trail connection at only one corner, and channelized right-turn lanes.

3 Limited east-west connections along TH 55, between Xenium Lane/Northwest Boulevard and I-494. Worn pathways in the grass suggest pedestrian use.

Northwest Boulevard: Recommended Bike/Ped Improvements

Figure 23: Proposed bicycle/pedestrian improvements in Northwest Boulevard station area

Implementing a multi-use trail on the west side of Campus Drive from County Highway 61 to Xenium Lane and a continuous pedestrian connection along Annapolis Circle from the proposed station to Xenium lane will improve access to the medical offices and tech campuses that drive activity in this station area.

An east-west sidewalk or trail connection along Highway 55 between Xenium Lane / County Highway 61 and the I-494 frontage road (as shown on the station concept plans) will provide east-west connectivity to the proposed station from existing trail and sidewalk networks. The concept plans also include a proposed skyway connection over Highway 55 to the south redevelopment area which will increase safety by limiting the number of people who need to cross Highway 55 at grade.

- Existing Sidewalk
- Proposed Sidewalk
- Additional Proposed Sidewalk
- Existing Trail
- Proposed Trail
- Additional Proposed Trail
- Priority Bicycle and Pedestrian Station Access Routes

"Proposed Sidewalk" and "Proposed Trail" refer to infrastructure recommended in Plymouth's 2040 Comprehensive Plan. "Additional Proposed Sidewalk" and "Additional Proposed Trail" refer to infrastructure recommended by this study.

1 Widen existing walk on west side of Campus Drive to a multi-use trail and complete the missing link between the West Health driveway and Annapolis Circle.

2 Implement pedestrian crossing safety measures at Highway 55 and Xenium Lane/Northwest Boulevard at grade intersection.

3 Create east-west sidewalk or trail connections along Hwy 55 between Xenium Lane and 494 frontage road (noted on civil concept plans).

Northwest Boulevard: Potential Redevelopment Area Concept

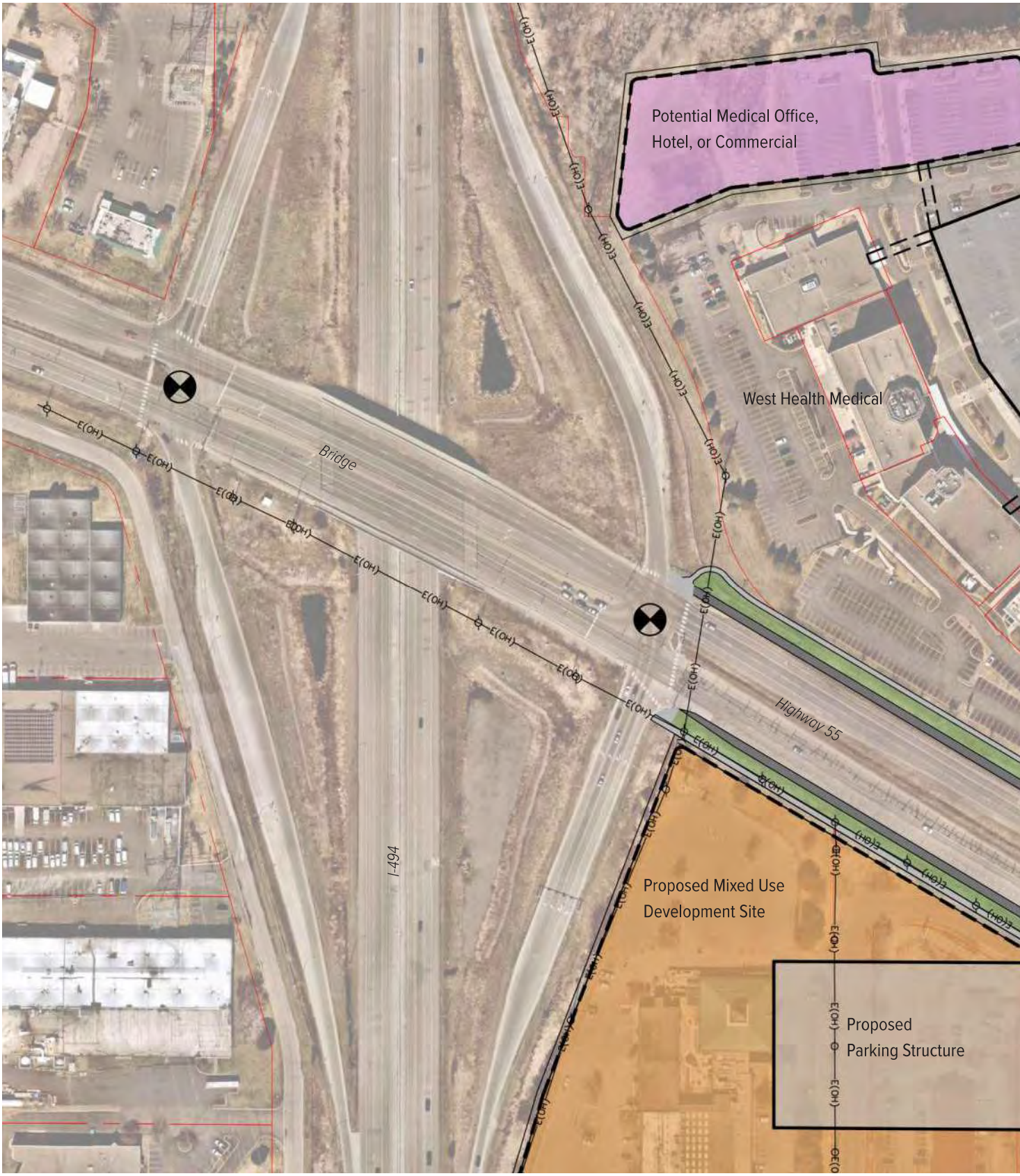
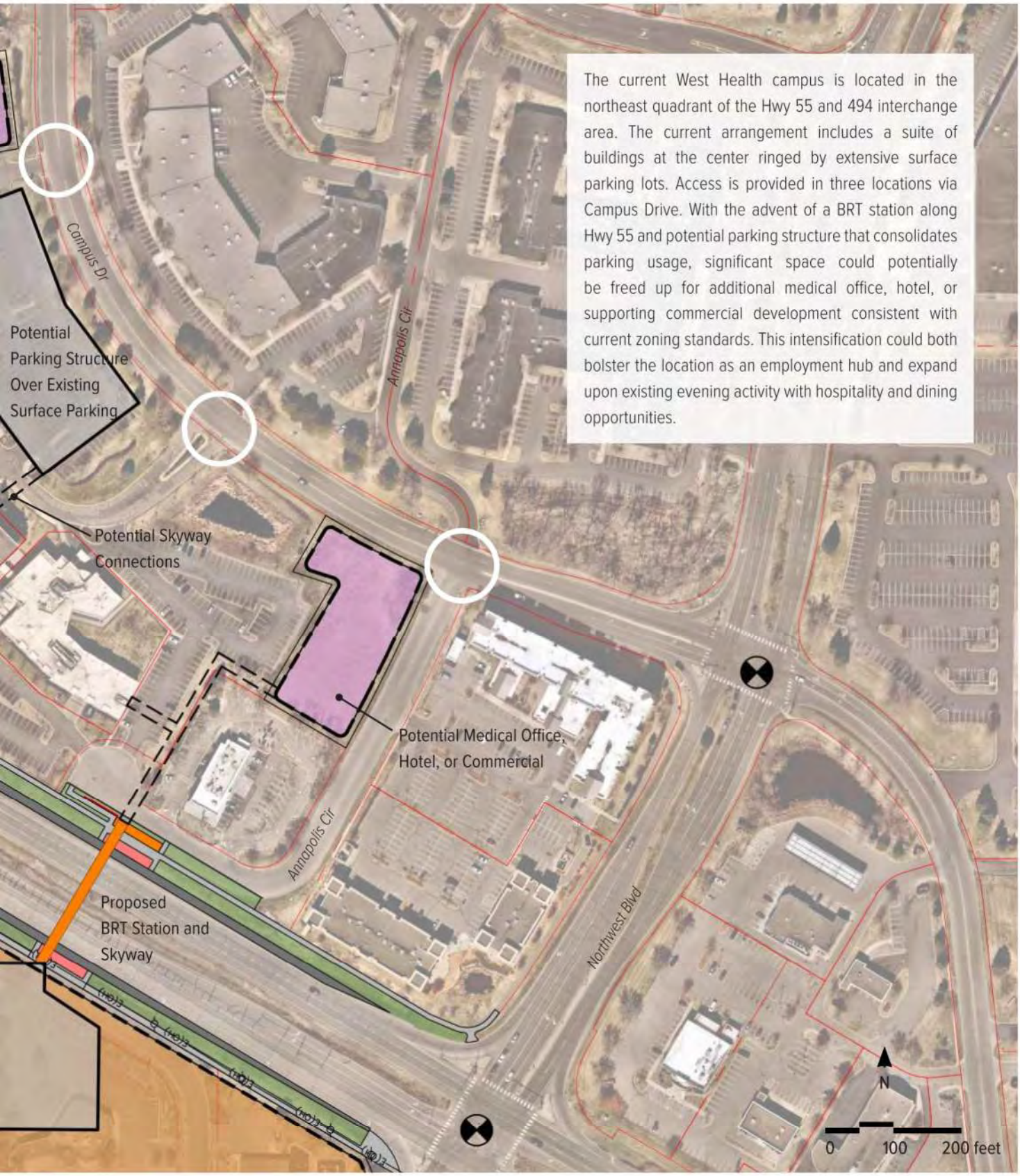


Figure 24: Northwest Boulevard potential redevelopment concept



The current West Health campus is located in the northeast quadrant of the Hwy 55 and 494 interchange area. The current arrangement includes a suite of buildings at the center ringed by extensive surface parking lots. Access is provided in three locations via Campus Drive. With the advent of a BRT station along Hwy 55 and potential parking structure that consolidates parking usage, significant space could potentially be freed up for additional medical office, hotel, or supporting commercial development consistent with current zoning standards. This intensification could both bolster the location as an employment hub and expand upon existing evening activity with hospitality and dining opportunities.

Station 73

Context and Character

The proposed station is located at the existing Station 73 park-and-ride facility, which sits prominently on the south side of an auto-oriented commercial corridor on Highway 55. The station area includes a mix of low to medium density housing, with a manufactured housing park, townhomes, senior housing, a three-story apartment complex, and single-family houses. Higher density housing is congregated north of Highway 55, with lower density to the south. The station area includes a large area of parks and open space, including patches of woods and wetlands and Bassett Creek. The northernmost part of the station area includes some land in the city of Medicine Lake.

Primary Destinations

- Station 73 Park and Ride
- Honeywell Campus
- The Waters (residential)
- Plymouth Lutheran Church
- LaCompte Playfield
- Restaurants
- Small offices
- Auto-oriented businesses
- Manufactured home park

Figure 25: Existing Station 73 Park-and-Ride facility

Figure 26: Auto-oriented businesses on north frontage road

Figure 27: Multifamily development north of Highway 55

Station 73: Existing Land Use

Figure 28: General land use in Station 73 station area

The half of the station area south of Highway 55 includes a high percentage of single family detached housing. However, there is a strong spine of commercial, single family attached, and multifamily parcels along Highway 55 and to the north. If currently undeveloped parcels fill in with denser residential and commercial uses according to planned land use, the potential ridership will increase.

	% Total Land Area
Single Family Detached	30%
Single Family Attached	10%
Multifamily	6%
Commercial and Office	12%
Industrial and Utility	1%
Institutional	4%
Parks and Open Space	12%
Undeveloped*	25%

**The "Undeveloped" parcels in this station area largely encompass wetlands and natural areas.*

Station 73: Planned Land Use

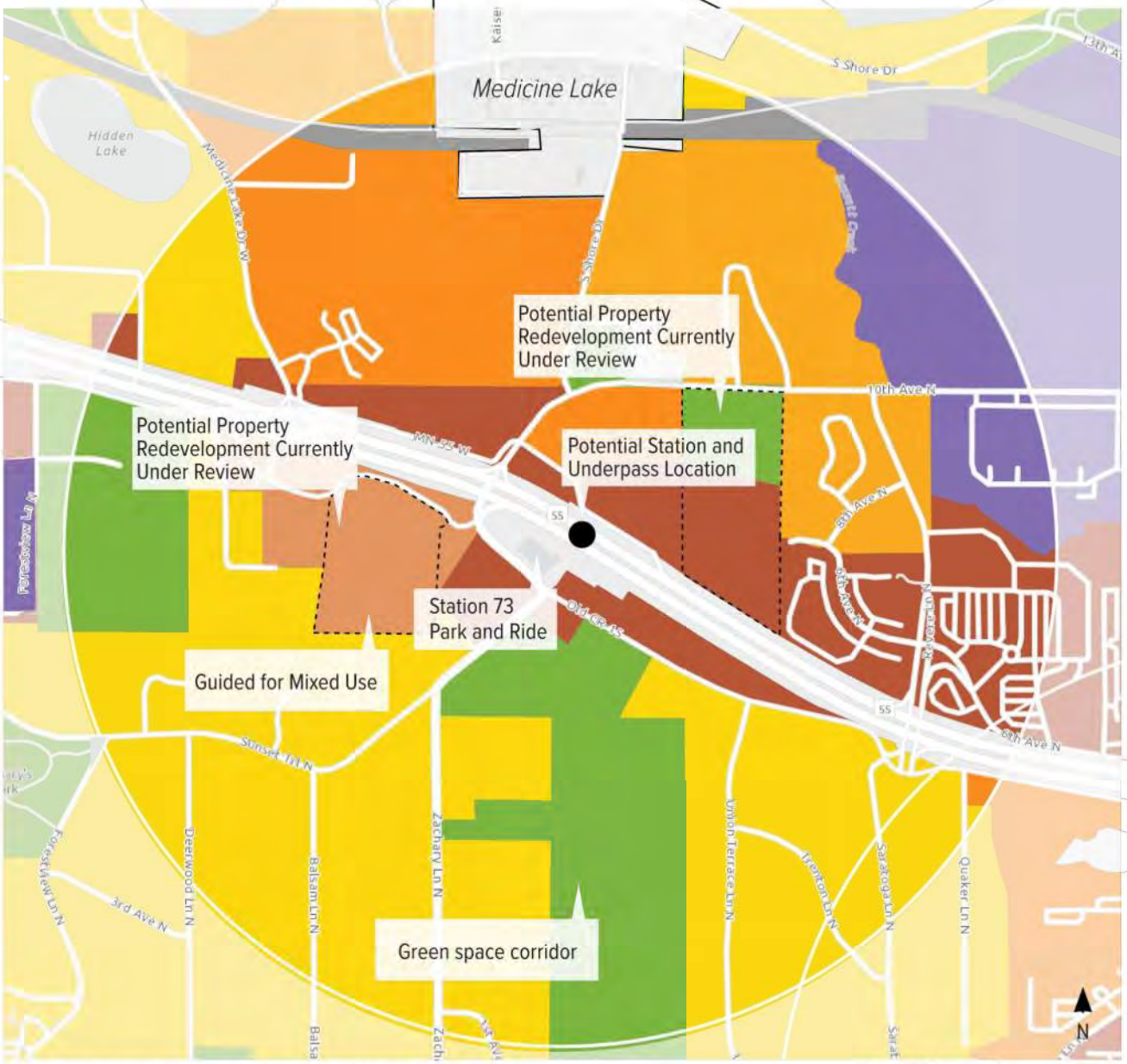


Figure 29: Planned land use in Station 73 station area

Living Area 1	2-3 units/acre
Living Area 3	6-12 units/acre
Living Area 4	12-20 units/acre
Mixed Use	12-25 units/acre
Commercial and Office	
Industrial and Utility	
Public / Institutional	
Railroad	

Many existing multifamily, single family attached, and undeveloped properties are consolidated into Living Area 4 (12-20 units per acre) and Living Area 3 (6-12 units per acre) zoning. Compared to the three units per acre for Living Area 1, this development could provide appropriate density and walkability for Transit-Oriented Development.

A new zoning designation - mixed use - is implemented for development south of Highway 55. This designation calls for a higher standard of site and building design, and will connect to the existing commerical spine along the highway frontage.

Station 73: Existing Bike/Ped Network

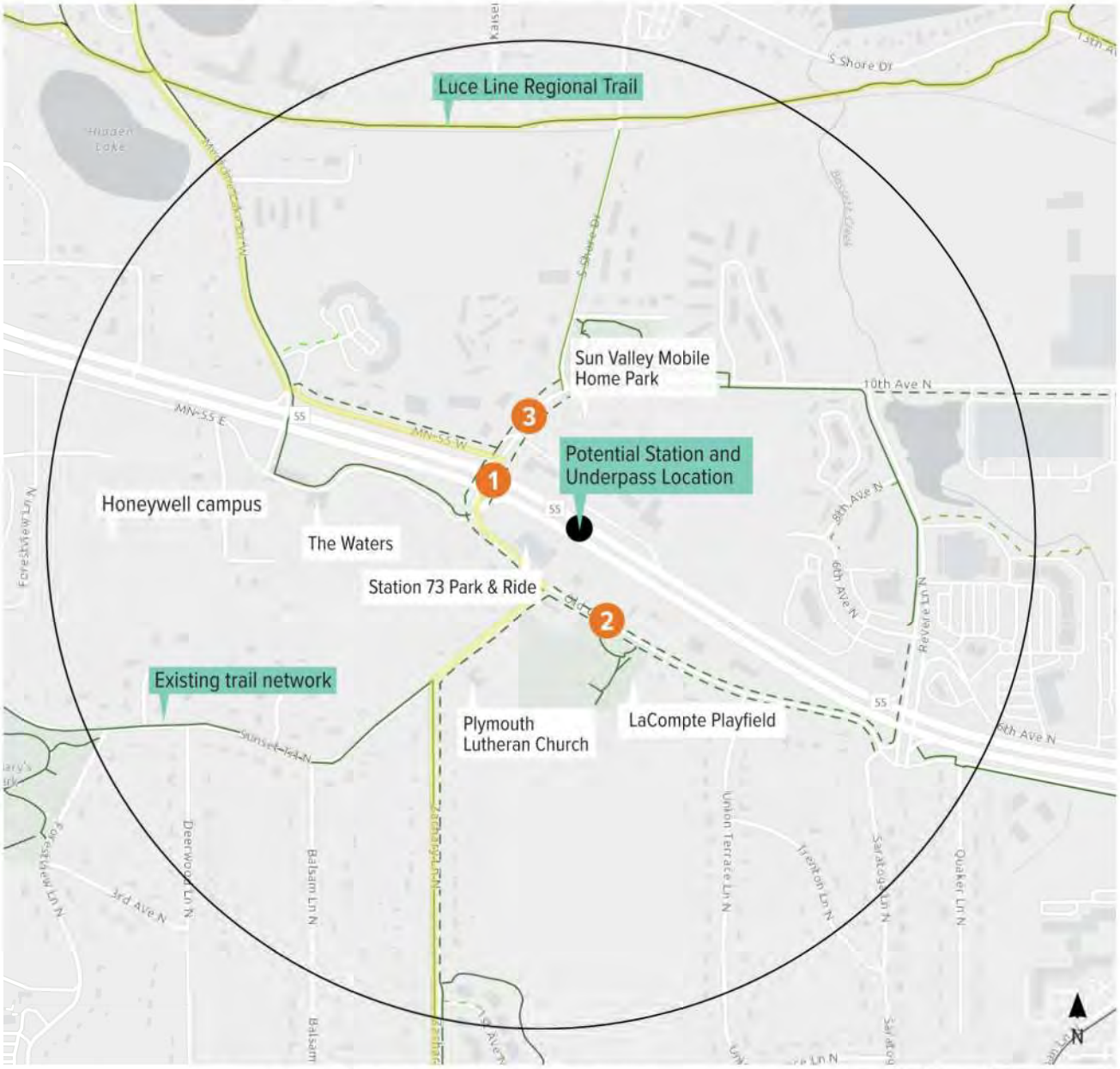


Figure 30: Existing bicycle/pedestrian infrastructure in Station 73 station area

This station area contains two regionally significant bicycle routes, including the Luce Line Regional Trail. While the station area has TOD-supportive density of housing, commercial, and retail land uses, the blocks directly surrounding the proposed station is currently auto oriented, with fragmented sidewalk and trail facilities. The existing trail/sidewalk crossing at Highway 55 and South Shore Drive has no sidewalk or trail connections on the north side, and few pedestrian safety features. The existing Station 73 park-and-ride building is ADA-accessible and offers bike lockers but lacks sidewalk and trail connections to the surroundings.

- Existing Sidewalk
- Proposed Sidewalk
- Existing Trail
- Proposed Trail
- RBTN Alignment*
- Connectivity Challenge

**Priority routes identified in Metropolitan Council's Regional Bicycle Transportation Network.*

1 Existing trail / sidewalk crossing of Highway 55 / South Shore Drive intersection has no sidewalk or trail connections on north side.

2 Existing park and ride facility lacks marked crosswalks, bicycle facilities, and sidewalk connection.

3 South Shore Drive currently has no dedicated bike / ped facilities.

Station 73: Recommended Bike/Ped Improvements

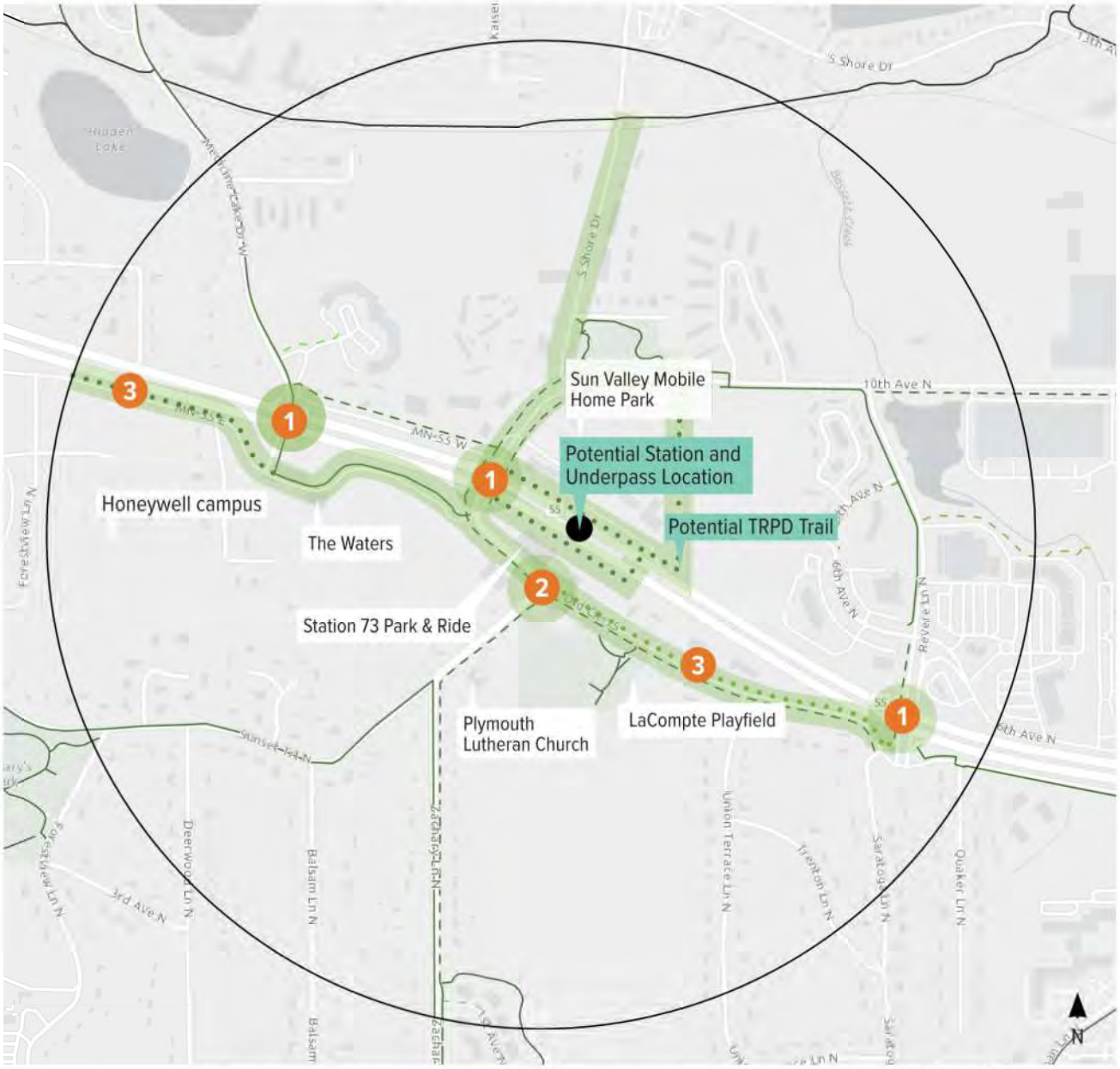


Figure 31: Proposed bicycle/pedestrian improvements in Station 73 station area

A multi-use trail connection directly south of the proposed station would improve access to the existing Station 73 park-and-ride building. Pedestrian safety measures at Highway 55 and County Road 73, West Medicine Lake Drive, and Old County Road 15 would improve connectivity to the commercial core and denser housing north of the proposed station. New sidewalks along Old County Road 15 would give pedestrians better and safer access to existing businesses. A trail extension going west along the Highway 55 Service Road would connect the station area to the Honeywell Campus – a major employment destination just outside the ½ mile radius service area.

- Existing Sidewalk
- Proposed Sidewalk
- Additional Proposed Sidewalk
- Existing Trail
- Proposed Trail
- Additional Proposed Trail
- Priority Bicycle and Pedestrian Station Access Routes

"Proposed Sidewalk" and "Proposed Trail" refer to infrastructure recommended in Plymouth's 2040 Comprehensive Plan. "Additional Proposed Sidewalk" and "Additional Proposed Trail" refer to infrastructure recommended by this study.

1 Implement pedestrian crossing safety measures at Hwy 55/CR 73, Hwy 55/West Medicine Lake Drive, and CR 73/Old County Road 15 at grade intersections.

2 Construct Zachary Lane/ Old County Rd 15/South Shore Drive multi-use trail connection (Three Rivers Park District concept).

3 Extend multi-use trail along south Hwy 55 Service Road between Honeywell Campus and Revere Lane.

Station 73: Potential Redevelopment Area Concept

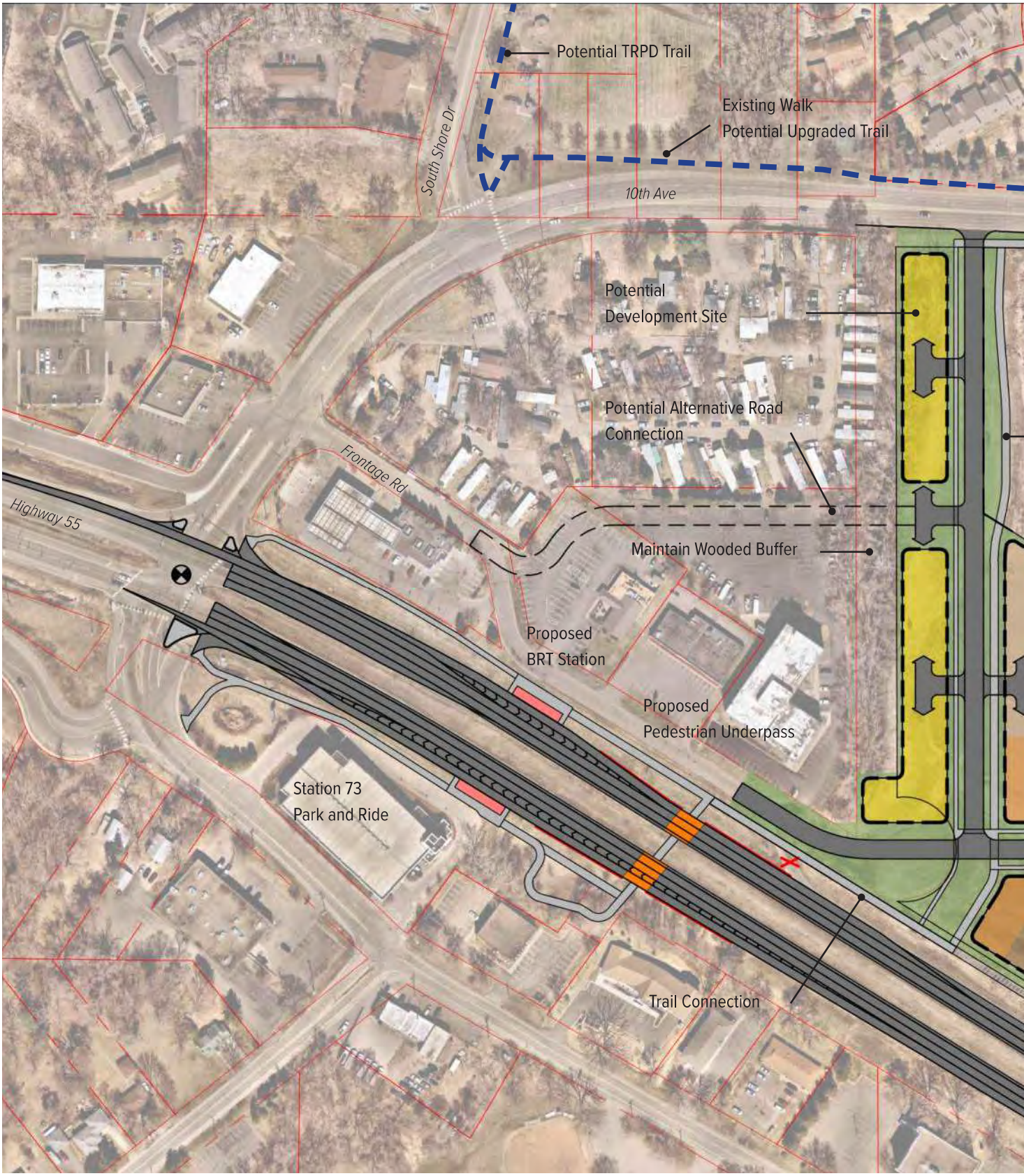


Figure 32: Station 73 potential redevelopment concept

In the northeast quadrant of the Hwy 55 and County Road 73 area, the former commercial site affords a significant redevelopment opportunity in close proximity to the proposed BRT station and Station 73 Park and Ride. In the station design concept, the existing westbound Hwy 55 frontage road exit-only access would be removed, but the property would still be accessible 10th Ave N and the north frontage road. The site has a wetland complex in the northeast corner that limits buildable area but could also become a highlighted natural feature that would be attractive to suburban living. At the center of the development would be a low-speed local road that creates sub-parcels for different scales of residential and mixed-use development. Higher densities would be focused closer to the BRT station and Hwy 55 at the south end of the property.

Ford Road

Context and Character

This ½ mile radius station area spans four cities: Plymouth, Golden Valley, Saint Louis Park, and Minnetonka. Development density is high, with several three to four story multifamily buildings and mid-sized office towers. To the east of Highway 169, the General Mills corporate headquarters is a regional employment destination. Single story restaurants and other businesses fill a retail hub northwest of the proposed station. The station area also contains several natural resources, including wetlands, wooded areas, Bassett Creek, General Mills Nature Preserve, and Shelard Park.

Primary Destinations

- Emagine Willow Creek Theater
- Family Child Development Center
- Retail
- Wells Fargo
- Offices
- Marriott West/La Quinta hotels
- Herzing University
- Shelard Park

Figure 33: Existing commercial center at the Shelard Parkway / Nathan Lane intersection.

Figure 34: New multifamily development on Nathan Lane north of the proposed station location.

Figure 35: Commercial development on Ford Road south of the proposed station location.

Ford Road: Existing Land Use

Figure 36: General land use in Ford Road station area

With a high percentage of commercial and multifamily properties, this station area already has density to provide significant BRT ridership. However, the confluence of three major highways (55, 65, and I-394) could limit accessibility to destinations further from the central station, except to the west.

	% Total Land Area
Single Family Detached	11%
Multifamily	17%
Commercial and Office	29%
Industrial and Utility	<1%
Parks and Open Space	7%
Highway	25%
Undeveloped	11%

Ford Road: Planned Land Use

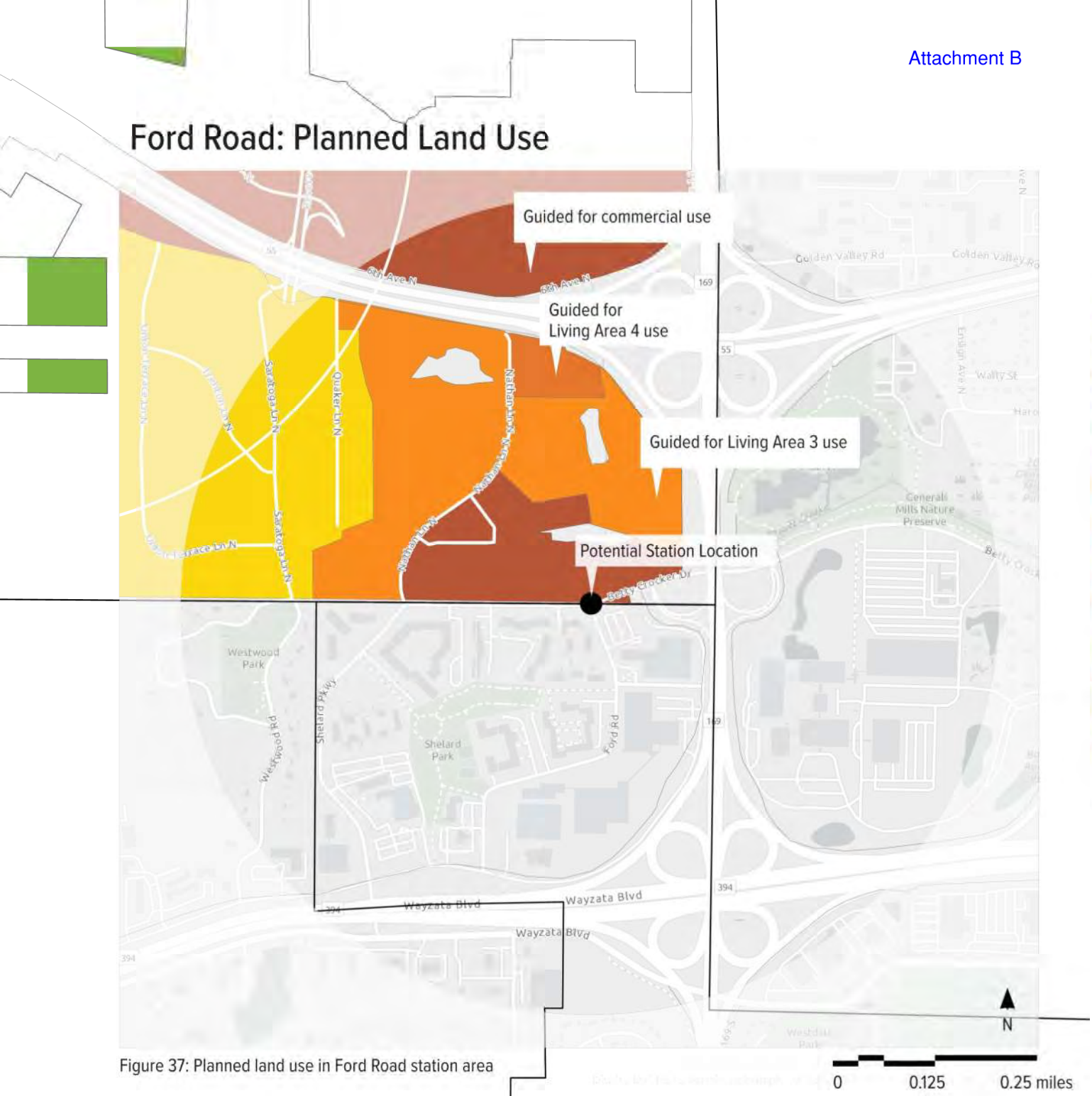


Figure 37: Planned land use in Ford Road station area

Planned land use for this station area will maintain or increase density of housing and commercial destinations, supporting TOD.

Living Area 1	2-3 units/acre
Living Area 3	6-12 units/acre
Living Area 4	12-20 units/acre
Commercial and Office	

Ford Road: Existing Bike/Ped Network

Figure 38: Existing bicycle/pedestrian infrastructure in Ford Road station area

Several existing trails, sidewalks, and on-road bike lanes support the dense commercial and residential activity within the Ford Road station area. This station area also includes recreation trail networks in the General Mills Nature Preserve and Shelard Park. However, trail and sidewalk gaps on Nathan Lane and Betty Crocker Drive prevent direct routes to the proposed station location for pedestrians.

- Existing Sidewalk
- Proposed Sidewalk
- Existing Trail
- Proposed Trail
- On-Road Bike Route
- Connectivity Challenge

1 Sidewalk gap on Shelard Parkway limits east-west pedestrian connectivity to the station location.

2 Trail and sidewalk gap along Betty Crocker Drive - 169 interrupts continuity between bicycle and pedestrian infrastructure.

3 Existing crossing at Ford Road/Shelard Parkway intersection is auto-oriented with very minimal sidewalk space at corners.

Ford Road: Recommended Bike/Ped Improvements

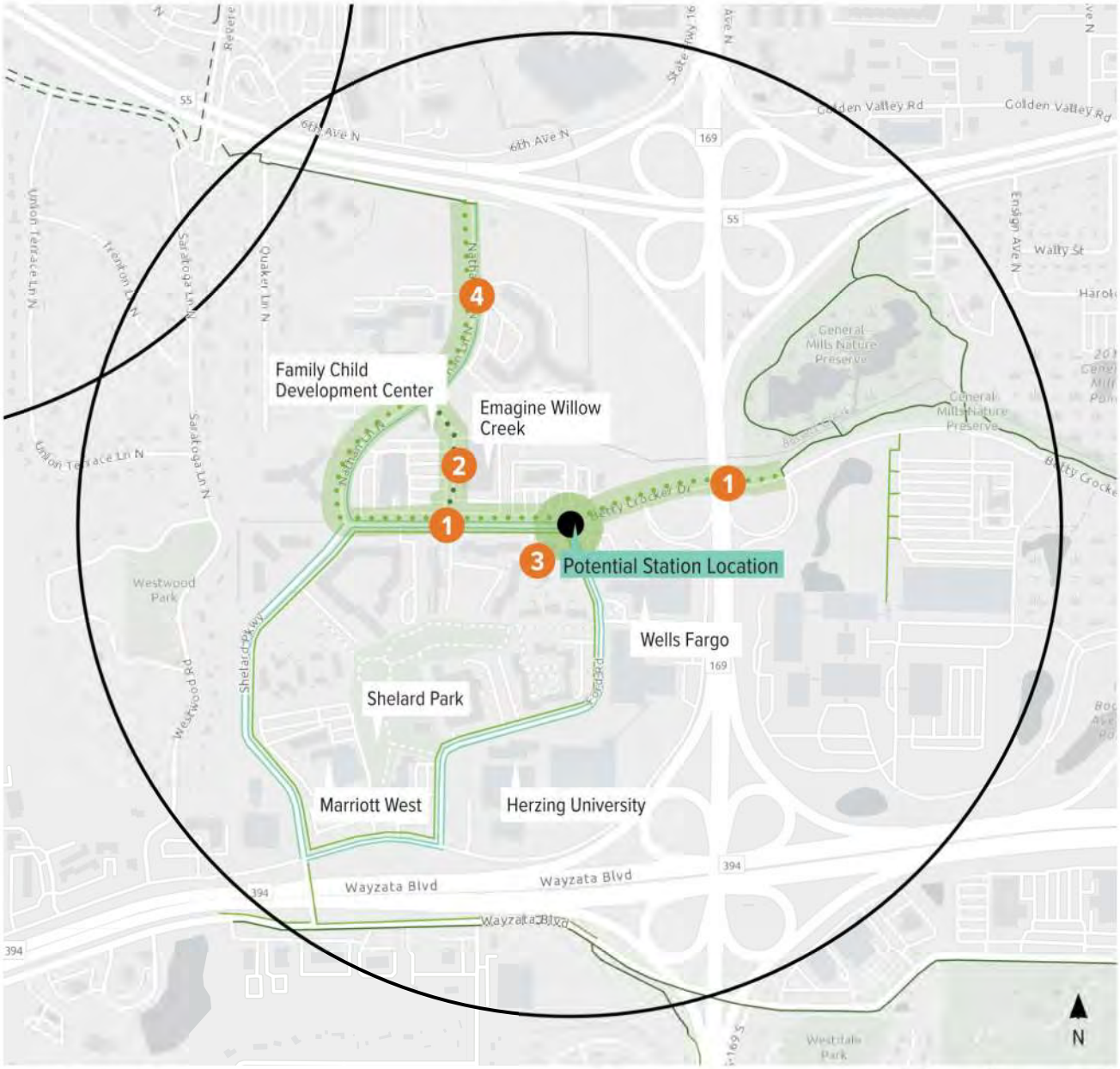
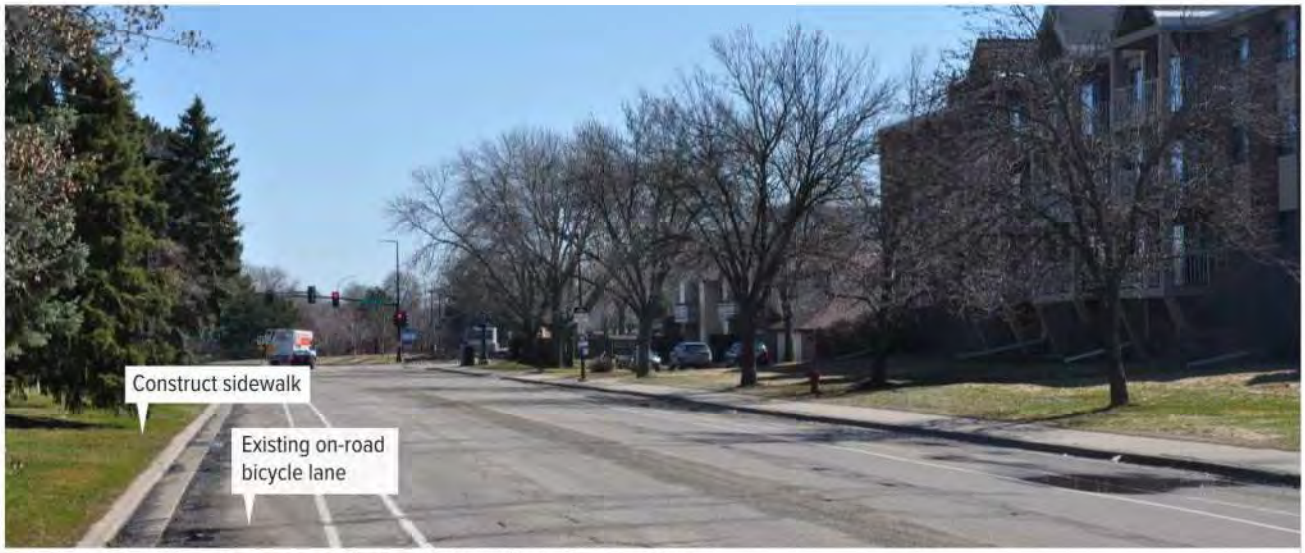


Figure 39: Proposed bicycle/pedestrian improvements in Ford Road station area

Connectivity improvements within the Plymouth boundary should relate directly to those in adjacent cities (Golden Valley, Saint Louis Park, and Minnetonka) to maximize benefit for transit users. Closing the sidewalk gaps on Nathan Lane and Betty Crocker Drive will improve pedestrian circulation to new and existing commercial, retail, and residential destinations. A direct bicycle and pedestrian route through the commercial center on Nathon Lane and Shelard Parkway would improve BRT riders' access to these businesses. Adding pedestrian crossing measures at the Ford Road and Shelard Parkway intersection will improve safety and experience for all modes of transportation.

- Existing Sidewalk
- Proposed Sidewalk
- Additional Proposed Sidewalk
- Existing Trail
- Proposed Trail
- Additional Proposed Trail
- Existing On-Road Bike Route
- Priority Bicycle and Pedestrian Station Access Routes

"Proposed Sidewalk" and "Proposed Trail" refer to infrastructure recommended in Plymouth's 2040 Comprehensive Plan. "Additional Proposed Sidewalk" and "Additional Proposed Trail" refer to infrastructure recommended by this study.



1 Construct sidewalk on north side of Shelard Parkway/Betty Crocker Drive.

2 Create a direct pedestrian and bicycle route from Nathan Lane to Shelard Parkway through the central commercial site with an easement.

3 Implement pedestrian crossing safety measures at Ford Road/Shelard Parkway intersection.

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Attachment C
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Bolton-Menk.com

MEMORANDUM

Date: 6/8/2021

To: Chris LaBounty, PE
Jim Gersema PE

From: Kevin Mackey PE, PTOE
Ross Tillman PE

Subject: TH 55 BRT Traffic Analysis
City of Plymouth
Project No.: 0T4123201

Background

This memorandum summarizes traffic analyses that were completed to support station area planning for a proposed Bus Rapid Transit (BRT) line along the TH 55 corridor in Plymouth.

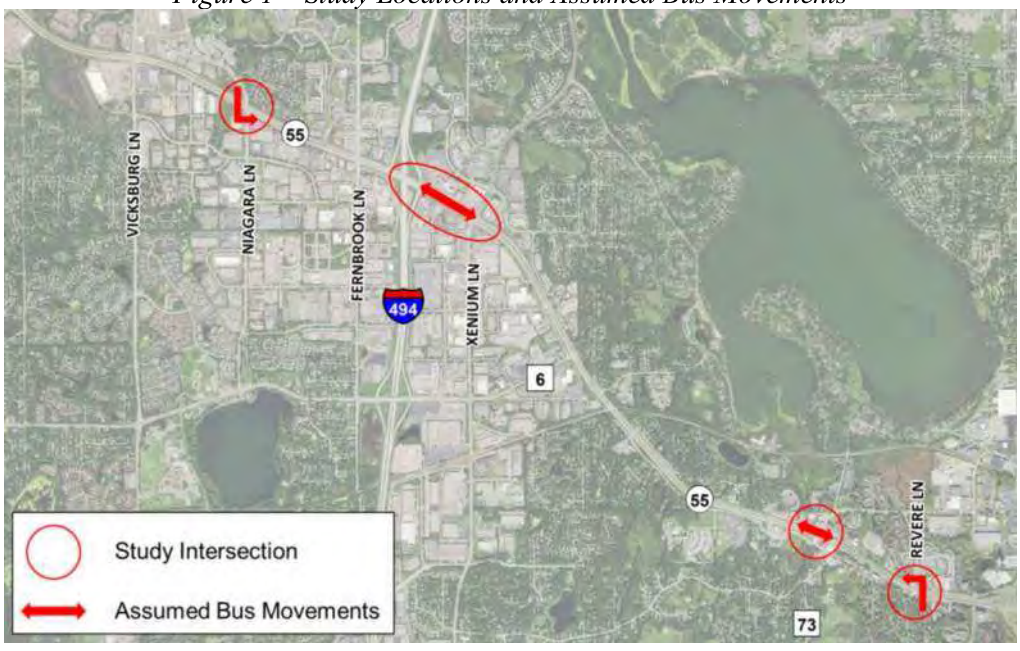
Study Locations

This analysis studied four different locations on the TH 55 corridor:

- Intersection of TH 55 and Plymouth Blvd/Niagara Lane
- TH 55 between Xenium Lane and I-494 northbound ramps (including both intersections)
- Intersection of TH 55 and County Road 73/Shore Drive
- Intersection of TH 55 and Revere Lane

The study locations and corresponding bus movements that were considered are shown in **Figure 1**.

Figure 1 – Study Locations and Assumed Bus Movements



Analysis Scenarios

This analysis was completed to compare traffic operations that are expected in each of the following scenarios:

- 2021 existing PM peak hour (no-build)
- 2021 PM peak hour with transit signal priority (TSP) at traffic signals
- 2021 PM peak hour with TSP and transit lanes/queue jumps
    - Transit lanes/queue jumps were only considered at the Xenium Lane/I-494 NB location and at the County Road 73/Shore Drive location

Analysis Methodology

Traffic operations analysis was performed for each scenario using the Vissim traffic simulation software. The analysis evaluated each study location in isolation given the high-level nature of the work, and therefore did not consider corridor-wide impacts or changes required to signal timing plans. Traffic simulation models were developed for the PM peak hour using signal timing data and 2018 turning movement data obtained from MnDOT. Given the ongoing COVID-19 pandemic, 2018 data is believed to be more representative of typical conditions than data from 2020 or early 2021.

When evaluating the impacts from transit improvements, the following was assumed and included in traffic simulation models:

- Proposed roadway improvements on TH 55 independent of transit improvements
    - Traffic models for all scenarios assume improvements that are shown on the scoping layout for MnDOT project S.P. 2723-144, dated 10/6/2020
- Transit headways
    - 10 minute bus headways were assumed
    - Existing conditions models include buses for delay comparison purposes, but existing conditions models do not include bus stops, dedicated bus lanes/shoulders, or transit signal priority
- Transit signal priority (TSP)
    - Bus-specific traffic detectors were placed on applicable intersection approaches when evaluating TSP. Once a bus reaches a bus detector, a call for transit priority is made. If the green phase for which TSP was called is already active, the green phase is extended to permit the bus to continue, otherwise the current phase is completed, with the following phase being the phase for which transit signal priority was called.
- Transit lanes/queue jumps
    - The assumed transit lane configuration varies by location, with details for each location presented in later sections of this document.
- Measures of effectiveness
    - The following information was obtained from simulation analysis for each scenario being studied:
        - Intersection and approach delays/levels of service
        - Bus delays

Analysis Results

TH 55 and Plymouth Blvd/Niagara Lane

Existing Conditions

Existing Conditions Assumptions:

- No changes to existing roadway configuration
- Assumes southbound left-turning buses for analysis purposes

Traffic Operations:

Existing PM peak hour operations are at LOS C overall, but more significant delays are experienced on the northbound and southbound approaches (LOS E and LOS F, respectively). With no transit signal priority, average bus delays are expected to be over 5 minutes for southbound left turning buses.

Side street delays are the combined result of of the long cycle length (220 seconds) that favors eastbound/westbound movements (around 73% of the overall cycle length is allocated to TH 55) and northbound/southbound split phasing for northbound/southbound left turns.

Table 1 – 2021 Existing PM Peak Hour Delay/LOS – TH 55 & Plymouth Blvd/Niagara Ln

Existing Conditions		
Approach	**Delay (sec)**	**LOS**
NB	56	E
SB	140	F
EB	22	C
WB	23	C
Total	41	C

SBL Bus Delay: 352 seconds

TSP Scenario

TSP Scenario assumptions:

- No bus stops are assumed to be on any intersection approach (simulation assumes buses simply travel through the intersection as southbound left turns). The concept assumed for this analysis has bus stops located on Plymouth Boulevard, near 35th Avenue North. This is shown in **Appendix A**.
- Transit signal priority is provided for southbound left-turning buses

Traffic Operations:

The provision of transit signal priority for southbound left turning buses is expected to provide significant bus delay reduction (86 percent delay reduction), but overall northbound delays would be increased by around 60 percent. Southbound operations are improved with the TSP provision, and eastbound and westbound operations are expected to remain at an acceptable LOS C.

Table 2 – 2021 PM Peak Hour Delay/LOS With Transit Signal Priority – TH 55 & Plymouth Blvd/Niagara Ln

TSP SBL			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	90	F	60%
SB	72	E	-49%
EB	23	C	3%
WB	21	C	-10%
Total	36	C	-12%

SBL Bus Delay: 48 seconds (86% reduction)

BRT Routing to Plymouth City Center:

When this analysis was completed, the final bus routes to access the City Center commercial area were yet to be determined. Simulation results presented in this report assume that buses would turn right into the commercial area at Vicksburg Lane, then out of the commercial area via left turns from Plymouth Boulevard.

While traffic simulation was not performed for the Vicksburg Lane intersection, it is expected that TSP for southbound left turns at Vicksburg Lane (if routing were to be reversed) would have more significant impacts to northbound traffic operations compared to those at the Plymouth Boulevard. Northbound traffic volumes are around 40 percent higher at Vicksburg Lane when compared to Plymouth Boulevard.

TH 55 and Xenium Lane/I-494 NB Ramps

Existing Conditions

Existing Conditions Assumptions:

- Assumes an auxiliary lane is added to westbound TH 55 between Xenium Lane and the I-494 northbound ramps, as shown on the MnDOT scoping layout. This added auxiliary lane becomes a right turn lane to I-494 northbound, with the existing westbound right turn lane converted to a westbound through lane.

Traffic Operations:
Existing PM peak operations are acceptable overall, however side street delays (northbound/southbound) are significant, especially for northbound Xenium Lane. Without transit signal priority, bus delays are expected to be the highest on the westbound approach of Xenium Lane (around 42 seconds on average).

Like most of the TH 55 corridor, the 220 second cycle length that prioritizes TH 55 movements is the main cause of lengthy side street delays.

Table 3 – 2021 Existing PM Peak Hour Delay/LOS – TH 55 & Xenium Lane and TH 55 & I-494 NB Ramps

Existing - Xenium		
Approach	**Delay**	**LOS**
NB	82.9	F
SB	48.8	D
EB	28.4	C
WB	36.3	D
Total	46.1	D

EB bus delay: 10.5 seconds
WB bus delay: 41.7 seconds

Existing - 494 NB Ramps		
Approach	**Delay**	**LOS**
NB	72.5	E
EB	28.1	C
WB	8.8	A
Total	26.4	C

EB bus delay: 6.8 seconds
WB bus delay: 1.4 seconds

Impact from Removing Minor Approach Right Turn Channelizing Island:
To provide additional design flexibility for transit facilities, the impacts of removing the northbound and southbound right turn channelizing islands at Xenium Lane were evaluated.

- Simulation analysis found that the northbound right turn can be removed while still maintaining northbound right turn LOS B.
- Removing the southbound channelized right however has more significant impacts, with southbound right turn LOS E if the channelization is removed (LOS A with channelization). The reduced level of service is expected to introduce queues that can extend back to Campus Drive during high-volume cycles.

TSP Scenario

TSP Scenario assumptions:

- Assumes added auxiliary lane between Xenium Lane and I-494 northbound ramps
- Bus stops are assumed to be provided in bus turnouts between Xenium Lane and I-494 northbound. The concept is shown in **Appendix A**.
- Transit signal priority is provided for eastbound and westbound buses at both Xenium Lane and I-494 northbound

Traffic Operations:

Side street delays are expected to be increased between 30 percent and 84 percent with the provision of transit signal priority, with the most significant increase being seen on the northbound approach of Xenium Lane. Eastbound and westbound bus delays are expected to be reduced by 49 percent and 67 percent respectively at Xenium Drive. Bus delay changes are minimal at the I-494 northbound ramps, but delays are minor under existing conditions.

Table 3 – 2021 PM Peak Hour Delay/LOS with Transit Signal Priority – TH 55 & Xenium Lane and TH 55 & I-494 NB Ramps

TSP EB/WB - Xenium			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	152.3	F	84%
SB	70.6	E	45%
EB	29.6	C	4%
WB	33.9	C	-7%
Total	64.1	E	39%

EB bus delay: 5.4 seconds (-49%)
WB bus delay: 13.9 seconds (-67%)

TSP EB/WB - 494 NB Ramps			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	93.9	F	30%
EB	29.7	C	6%
WB	8.9	A	1%
Total	30.9	C	17%

EB bus delay: 4.3 seconds (-37%)
WB bus delay: 7.4 seconds (+429%)

TSP + Transit Lane Scenario

TSP + Transit Lane Scenario Assumptions

- Assumes added auxiliary lane between Xenium Lane and I-494 northbound ramps, as shown on the MnDOT scoping layout
- Bus stops are assumed to be provided in bus turnouts between Xenium Lane and I-494 northbound. The concept is shown in **Appendix A**.
- Transit signal priority is provided for eastbound and westbound buses at both Xenium Lane and I-494 northbound
- Queue jumps at Xenium Lane: Assumes eastbound and westbound queue jumps that utilize the shoulder. Also assumes the northbound right turn channelization is removed.
- Queue jumps at I-494 northbound ramps: Assumes a westbound queue jump lane that utilizes the shoulder

Traffic Operations:

The addition of queue jumps is not expected to significantly impact operations compared to the condition that only implements transit signal priority. This is primarily a result of TH 55 movements receiving the majority of green time at the signal. Minor approach delays are still expected to increase significantly, especially at Xenium Lane.

Table 4 – 2021 PM Peak Hour Delay/LOS with Transit Signal Priority and Transit Queue Jumps – TH 55 & Xenium Lane and TH 55 & I-494 NB Ramps

TSP EB/WB + EB/WB Queue Jump - Xenium			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	153.3	F	85%
SB	71.1	E	46%
EB	29.6	C	4%
WB	33.9	C	-7%
Total	64.4	E	40%

EB bus delay: 6.4 seconds (-40%)
WB bus delay: 13.4 seconds (-68%)

TSP EB/WB + WB Queue Jump - 494 NB Ramps			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	89.6	F	24%
EB	27.7	C	-1%
WB	8.7	A	-1%
Total	29.1	C	10%

EB bus delay: 3.5 seconds (-49%)
WB bus delay: 3.9 seconds (+179%)

TH 55 and County Road 73/Shore Drive (Station 73)

Existing Conditions

Existing Conditions Assumptions:

- Assumes the westbound channelized right turn is removed, as shown on the MnDOT scoping layout.

Traffic Operations:

Like most of the corridor, TH 55 movements are prioritized in the 220 second cycle length, resulting in poor PM peak hour levels of service on the northbound and southbound approaches (LOS E and LOS F, respectively). Eastbound and westbound bus delays are expected to be around 35 seconds if no transit signal priority is provided.

Table 5 – 2021 Existing PM Peak Hour Delay/LOS– TH 55 & County Road 73/Shore Drive

Existing		
Approach	**Delay**	**LOS**
NB	68.7	E
SB	91.9	F
EB	33.2	C
WB	32	C
Total	40.3	D

EB bus delay: 34.4 seconds
WB bus delay: 35.1 seconds

Impacts from Removing Northbound Right Turn Channelizing Islands:

The impact from removing the northbound channelized right turn was evaluated. In the PM peak hour, converting this to a standard right turn lane is expected to change the northbound right turn level of service from LOS A to LOS E, but the overall northbound approach level of service would be unchanged at LOS E. This was considered in an effort to improve pedestrian walkability in the station area, however additional factors that are not reflected in this traffic analysis must be considered as well (for example, large vehicle turning movement paths given the intersection skew).

Transit Signal Priority Scenario

Transit Signal Priority Scenario Assumptions:

- Assumes the westbound channelized right turn is removed
- Bus stops are assumed to be provided in bus turnouts east of County Road 73/Shore Drive
    - Median bus stops were considered in early analysis, however such a concept was not advanced due to concerns related to conflicts between buses and moving traffic in the adjacent left through lanes in close proximity to a signalized intersection
- Transit signal priority is provided for eastbound and westbound buses

Traffic Operations:

Transit signal priority is expected to reduce eastbound bus delays by around 38 percent, but northbound and southbound vehicle delays are expected to increase by 36 percent and 64 percent, respectively.

Table 6 – 2021 PM Peak Hour Delay/LOS with Transit Signal Priority – TH 55 & County Road 73/Shore Drive

TSP EB/WB			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	93.6	F	36%
SB	151.1	F	64%
EB	33	C	-1%
WB	29.8	C	-7%
Total	45.2	D	12%

EB bus delay: 21.2 seconds (-38%)
WB bus delay: 40 seconds (+14%)

TSP + Transit Lane Scenario

TSP + Transit Lane Scenario Assumptions:

- Assumes the westbound channelized right turn is removed
- Bus stops are assumed to be provided in bus turnouts east of County Road 73/Shore Drive. This concept is shown in **Appendix A**
- Transit signal priority is provided for eastbound and westbound buses
- Eastbound and westbound queue jumps are provided on the shoulder
- Assumes the northbound channelized right turn is removed

Traffic Operations:

The queue jumps are not expected to mitigate operations deficiencies, but simulation results show 8 to 12 percent less minor approach delay compared to the TSP only condition.

Table 7 – 2021 PM Peak Hour Delay/LOS with Transit Signal Priority and Queue Jumps – TH 55 & County Road 73/Shore Drive

TSP EB/WB + Queue Jumps			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	86.5	F	26%
SB	132.9	F	45%
EB	39.9	D	20%
WB	29.6	C	-8%
Total	46.1	D	14%

EB bus delays: 30.9 seconds (-10%)
WB bus delays: 23 seconds (-34%)

TH 55 and Revere Lane

Existing Conditions

Existing Conditions Assumptions:

- Assumes existing intersection configuration
- Assumes northbound left turning buses for analysis purposes

Traffic Operations:

Existing PM peak operations are acceptable overall at LOS C, but side street approaches experience more significant delays with northbound and southbound LOS E as a result of cycle length allocation favoring TH 55 movements combined with northbound/southbound split phasing for left turns. Without transit signal priority, northbound left turning buses would experience around two minutes of delay on average.

Table 8 – 2021 Existing PM Peak Hour Delay/LOS– TH 55 & Revere Lane

Existing		
Approach	**Delay**	**LOS**
NB	73	E
SB	67.4	E
EB	24.2	C
WB	22.7	C
Total	30.1	C

NBL bus delay: 118.5 seconds

Transit Signal Priority Scenario

Transit Signal Priority Scenario Assumptions:

- Assumes transit signal priority is given for northbound left turning buses

Traffic Operations:

The provision of transit signal priority for northbound left turning buses is expected to reduce bus delays by over 50 percent, but diminish side street operations from LOS E to LOS F. Operations on TH 55 are expected to remain acceptable with eastbound and westbound LOS C.

Table 9 – 2021 PM Peak Hour Delay/LOS with Transit Signal Priority – TH 55 & Revere Lane

TSP NBL			
Approach	**Delay**	**LOS**	**Delay Chg.**
NB	84.7	F	16%
SB	80.7	F	20%
EB	30.2	C	25%
WB	21.9	C	-4%
Total	33.9	C	13%

NBL bus delay: 52 seconds (-56%)

Conclusions

Transit Signal Priority

Traffic operations results from this analysis shows that traffic impacts from transit signal priority can vary based on how it is applied. Transit signal priority offers the most bus delay improvements for buses turning from side streets onto TH 55, however at the expense of overall intersection efficiency. Bus delay improvements are less significant with TSP for buses traveling eastbound or westbound on TH 55 since these movements already receive the majority of green time at signals along the corridor.

Queue Jumps

Queue jumps were not found to have a significant impact on bus delays, however it is recommended that dedicated bus lanes/shoulder areas are provided to the maximum extent feasible to minimize conflicts between buses and vehicles in terms of merging/weaving. While simulation models did not show issues related to buses being able to merge into traffic, dedicated bus space can allow buses more distance to accelerate and merge back into traffic, minimizing speed differentials between buses and other traffic on TH 55.

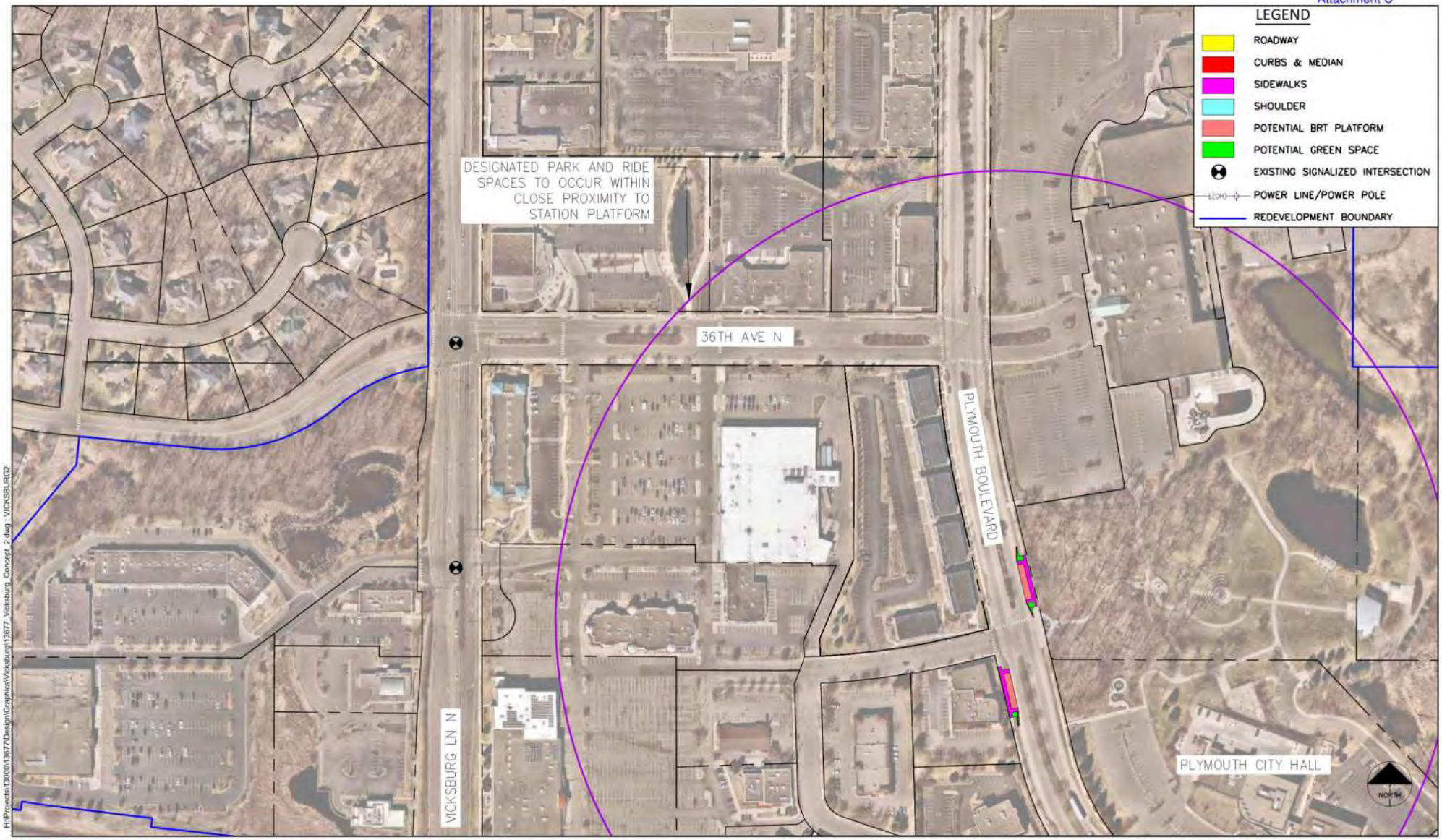
Next Steps

The following next steps are recommended:

- Use results from this analysis to support ongoing station area design
- Once station area designs become clearer, a more comprehensive corridor-wide simulation model should be developed. A corridor model will provide a better understanding of how operations at adjacent intersections can interact with each other, especially within the coordinated signal system.
    - A key element of future traffic modeling will be coordination with MnDOT related to corridor-wide signal timing and coordination impacts associated with potential transit advantages.

Appendix A - Plymouth Boulevard Station Concept (Subject to Change)

Attachment C



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SRF

Job #
5/17/2021 - 1:23PM

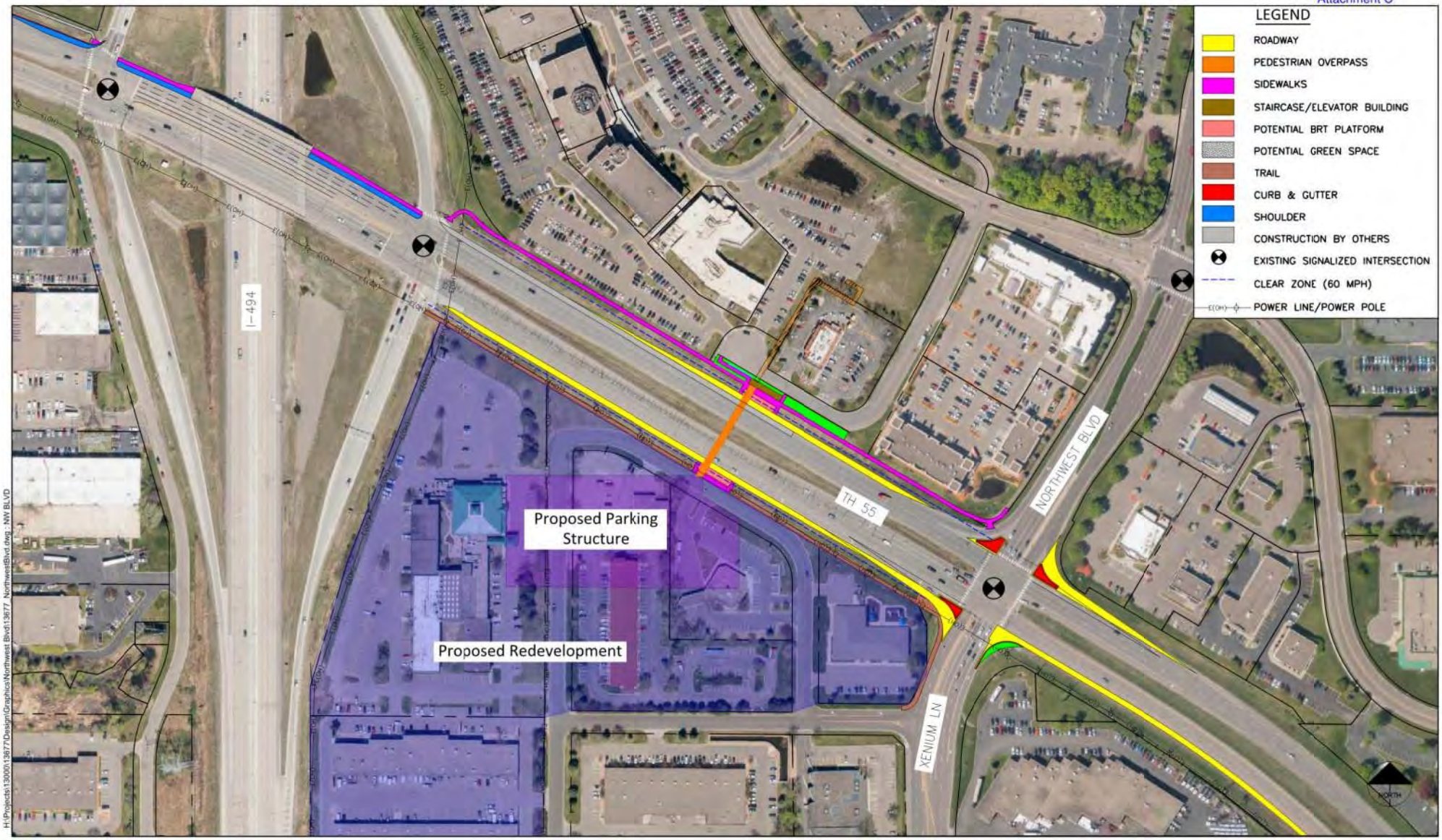
TH 55 BRT
VICKSBURG - OPTION 2

Figure 4

0 50 100 200

Appendix A - Xenium Lane/I-494 Station Concept (Subject to Change)

Attachment C



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SRF

Job #
5/17/2021 - 1:28PM

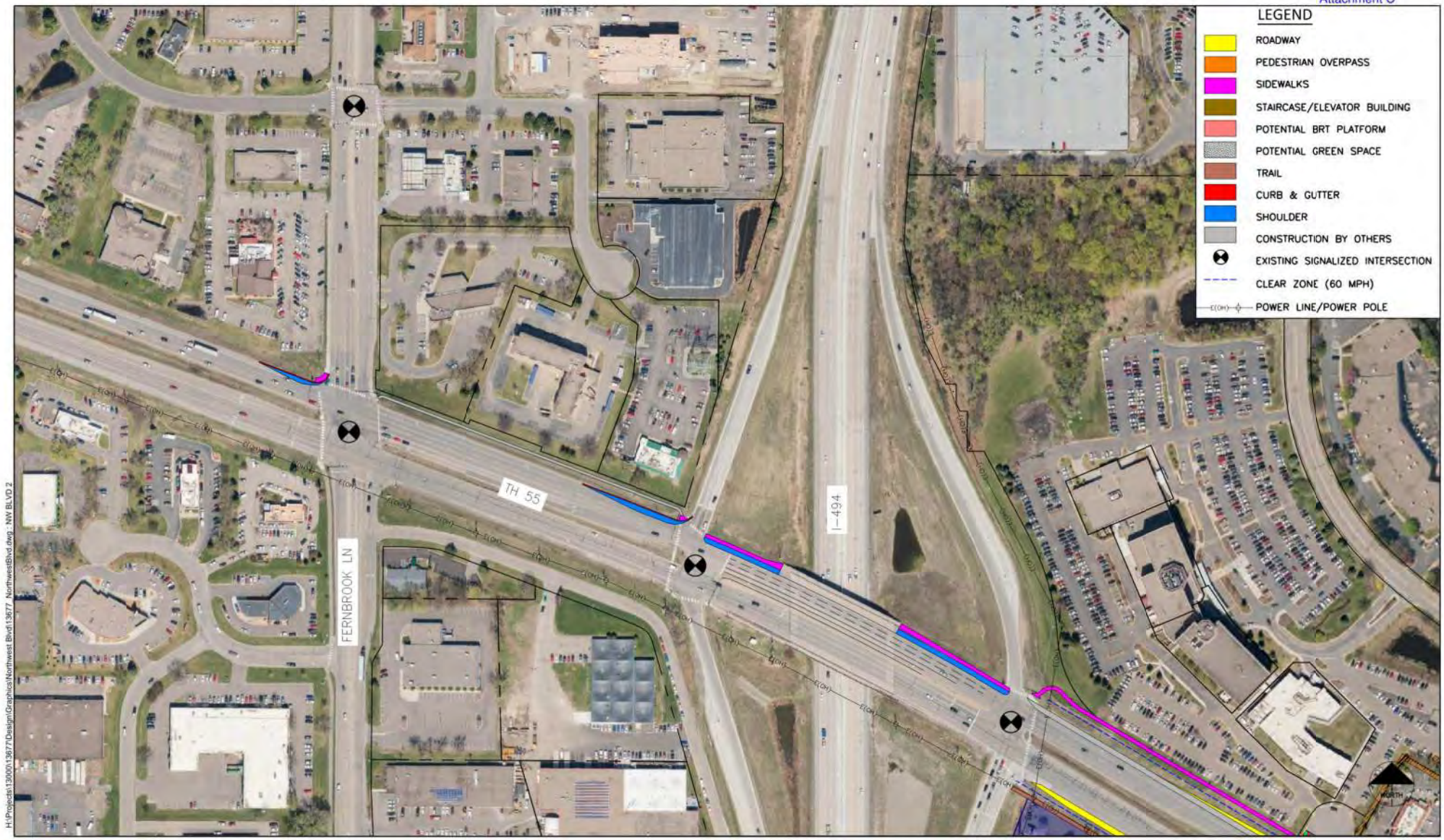
TH 55 BRT
NORTHWEST BOULEVARD - OPTION 1

Figure 6.1

0 50 100 200

Appendix A - Xenium Lane/I-494 Station Concept (Subject to Change)

Attachment C



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SRF

Job #
5/17/2021 - 1:27PM

TH 55 BRT
NORTHWEST BOULEVARD - OPTION 1

Figure 6.2

0 50 100 200

Appendix A - Xenium Lane/I-494 Station Concept (Subject to Change)

Attachment C

SRF

Job #
5/17/2021 - 1:27PM

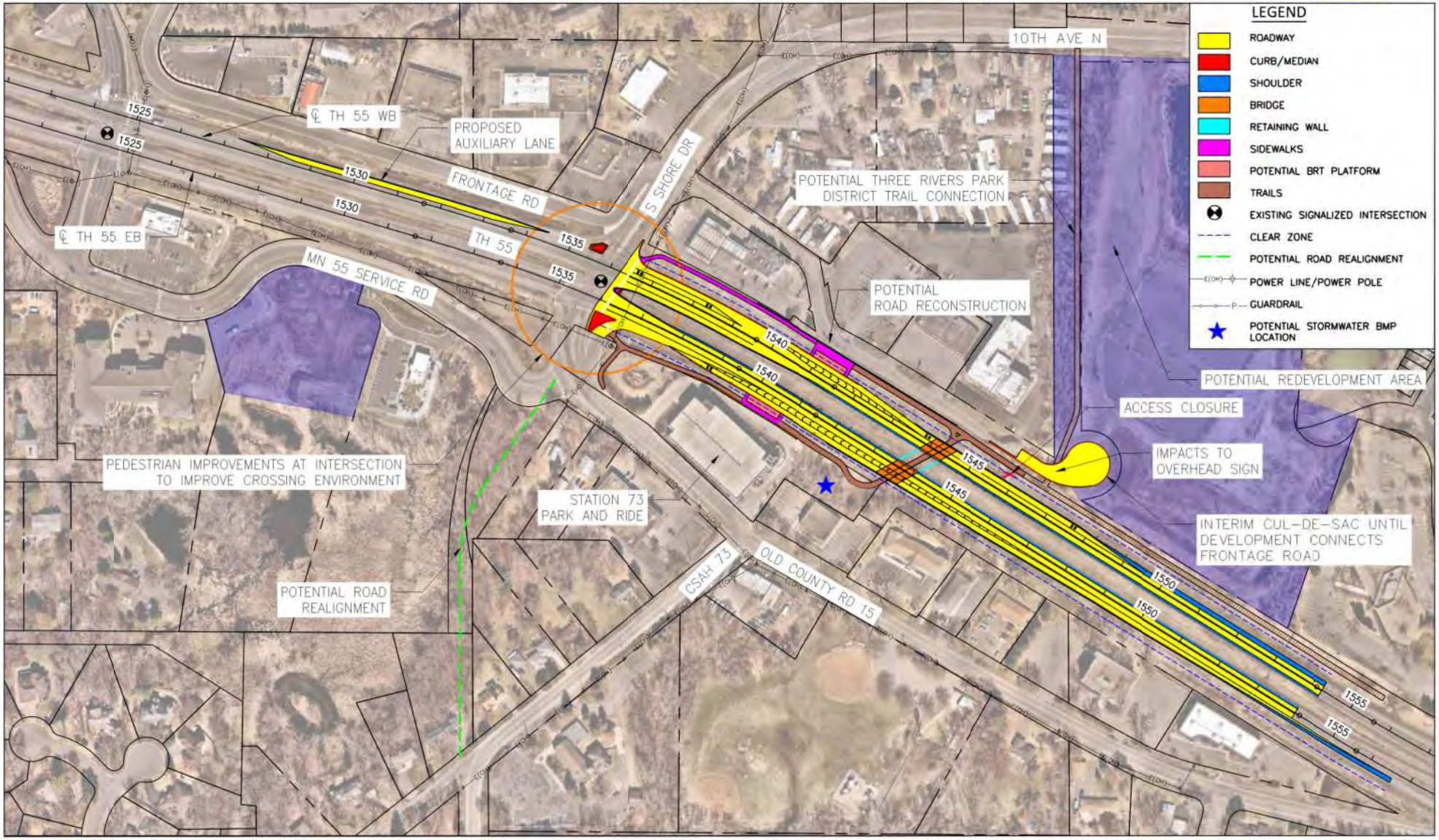
TH 55 BRT
NORTHWEST BOULEVARD - OPTION 1

Figure 6.3

0 50 100 200

Appendix A - CR 73 Station Concept (Subject to Change)

Attachment C



SRF

TH55 BRT
STATION 73 - OPTION 2

Figure 10

SRF City of Plymouth